New and Modified Access on I-5 between NE 179th Street and Ridgefield Interchanges

Access Decision Report

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Table of Contents

EXECUTIVE SUMMARY 1
Background 1
Study Area 2
Purpose and Need 3
Preferred Operational Alternative 3
Benefits of the Preferred Operational Alternative 4
Conditions of Approval 4
Access Decision Criteria 5
Policy Point One: Future Interchanges 5
Policy Point Two: Land Use and Transportation Plans 6
Policy Point Three: Reasonable Alternatives 7
Policy Point Four: Need for the Access Point Revision 8
Policy Point Five: Access Connections and Design 9
Policy Point Six: Operational and Accident Analyses 9
Policy Point Seven: Coordination 10
Policy Point Eight: Planning and Environmental Process 11

POLICY POINT ONE: FUTURE INTERCHANGES 27
I-5 Network Plan 27
Policy Point One Conclusions 28

POLICY POINT TWO: LAND USE AND TRANSPORTATION PLANS 29
Transportation and Land Use Plans 30
Existing Local, State, and Regional Plans 30
Local Plans 30
Regional Plans 31
State Plans 31
Consistency with Established Plans 31
Urban Growth Area 32
Land Use/Zoning Plans 32
Secondary Land Use Impacts 32
Transportation Plans 32
Access Management 32
Consistent Identification of Operational Deficiency 33
Transit/Transportation System Management Strategies (TSM) Explored 33
Policy Point Two Conclusions 34

POLICY POINT THREE: REASONABLE ALTERNATIVES 35
Existing Conditions 37
Short-Term Outlook 37
Long-Term Outlook 38
Alternatives Analysis 38
Minor Improvements to Existing Interchanges 45
Local Improvements 45
Major Improvements to the Existing NE 179th Street Interchange 46

SR 502 Alternatives 47
NE 219th Street Interchange 48
Policy Point Three Conclusions: Reasonable Alternatives 50

POLICY POINT FOUR: NEED FOR THE ACCESS POINT REVISION 52
Analysis 53
Policy Point Four Conclusions: Need 54

POLICY POINT FIVE: ACCESS CONNECTIONS AND DESIGN 55
Background 55
Alternatives 55
Design Standards 56
Design Conditions of the Features 56
Local Improvements 56
Interchange Improvements 56
Reconfigure 179th Street interchange as a Single Point Urban Interchange(SPUI) 56
Construct new interchange at 219th Street 57
Access Control 57
Ramp Spacing and Weaving Summary 57
Policy Point Five Conclusions: Design 57

POLICY POINT SIX: OPERATIONAL AND ACCIDENT ANALYSES 59
Analysis Methodology 59
Defining No Significant Adverse Impact 61
Simulation Results 61
Benefits and Costs 63
Accident Analysis for the Preferred Operational Alternative 66
Policy Point Six Conclusions: Safety and Operational Analysis 68

POLICY POINT SEVEN: COORDINATION 91
Funding 91
Development 92
Agency Coordination 92
Public Involvement 93
General information 93
Private Sector Commitments 93
Policy Point Seven Findings: Coordination 93

POLICY POINT EIGHT: PLANNING AND ENVIRONMENTAL PROCESSES 97
Planning and Environmental Review 97
Process 97
Status 97
Study Area 97
Critical Environmental Resources 98
Potential Environmental Issues 99
Wetlands 99
Culvert Ratings for Fish Passage 99
Cultural Resources 99

Hazardous Material Sites 100
Other Considerations 100
Policy Point Eight Conclusions: Planning and Environmental Process 100

List of Tables

Table 1. Existing and Projected Levels-of-Service and Queuing on I-5 and I-205 40
Table 2. Evaluation Summary 50
Table 3. Benefit/Cost Calculations – 179th Street and 219th Street Interchanges 63
Table 4. Evaluation Results – Year 2025 Analysis 65
Table 5. Accident Results – Twenty Year Analysis 67

List of Figures

Figure 1. I-5 Between 179th Street and Ridgefield Study Area 13
Figure 2. 179th Street Interchange Year 2025 PM Trip Origins and Destinations 15
Figure 3. 219th Street Interchange Year 2025 Trip Origins and Destinations 17
Figure 4. 219th – Preferred Operational Alternative (Option A) 19
Figure 5. 219th – Preferred Operational Alternative (Option B) 21
Figure 6. 219th – Preferred Operational Alternative (Option C) 23
Figure 7. 179th Interchange – Preferred Operational Alternative 25
Figure 8. Existing Weaving On I-5 41
Figure 9. Existing and Projected – PM Peak Level of Service – No-Build 43
Figure 10. Simulation of Existing Conditions (PM Peak Hour) 69
Figure 11. Simulation of Year 2005 No-Build Conditions (PM Peak Hour) 71
Figure 12. Simulation of Year 2005 Preferred Alternative (PM Peak Hour) 73
Figure 13. 2025 No-Build Traffic Simulation 75
Figure 14. 2025 Local Improvements Alternative with 179th SPUI 77
Figure 15. 2025 SPUI Plus Flyovers at 179th 79
Figure 16. 219th Preferred Operational Alternative 81
Figure 17. 2025 No-Build – PM Peak Queuing and Level-of-Service 83
Figure 18. 2025 Local Improvements – PM Peak Queuing and Level of Service 85
Figure 19. 2025 179th SPUI Plus Flyover – PM Peak Queuing and Level of Service 87
Figure 20. 2025 Preferred – PM Peak Queuing and Level of Service 89
Figure 21. Public and Private Development Proposals in Interchange Vicinity 95

Appendices

Appendix A Comprehensive Plan Consistency Discussion

Appendix B Local Improvement Alternatives Analysis

Appendix C Travel Forecasting

Appendix D Design Report

Appendix E Operational and Safety Analysis

Appendix F Environmental Alternatives Analysis

Glossary of Acronyms

AASHTO = American Association of State Highway and Transportation Officials

C-TRAN = Clark County Public Transportation Agency

CORSIM = Corridor Simulation Model

FHWA = Federal Highway Administration

GMA = Washington State Growth Management Act

HCM = Highway Capacity Manual

HOV = High Occupancy Vehicle

HSP = Washington State Highway System Plan, a component of Washington's Transportation Plan

LOS = Level-of-Service, typically as defined by the Highway Capacity Manual

MTP = Metropolitan Transportation Plan, maintained by RTC

NEPA = National Environmental Policy Act

NHS = National Highway System

RTC = Southwest Washington Regional Transportation Council, Clark County's Metropolitan Planning Organization

TSM/TDM = Transportation System Management/Transportation Demand Management

WSDOT = Washington State Department of Transportation

Key Terms and Phrases

Duluth = Rural center located at the intersection of NE 10th Avenue and NE 219th Street

Deficiency = LOS E/F on most arterials and freeways in the Study Area, also locations of State Highway identified as High Accident Corridors

Trip Type: **Regional** trips begin in one urban area and end in another with the majority of the trip occurring on the Interstate, such as from central Vancouver to Salmon Creek. **Interstate** trips begin in one state and end in another, such as from Oregon to Washington. Trips from Portland to Salmon Creek could be considered either interstate or regional. Trips from one part of a state to another, such as from Seattle to Salmon Creek or Hazel Dell, could also be considered interstate trips, because they need to use the interstate system for the majority of the trip. **Local trips** are trips that travel on I-5 for short distances between adjacent interchanges.

Preferred Operational Alternative consists of:

The proposed access modification on I-5 between NE 179th Street and Ridgefield interchanges includes:

- Adding a new diamond-style interchange at approximately NE 219th Street (otherwise known as the SR 502 extension) providing access both north and south on I-5;
- Modernizing the NE 179th Street interchange by reconstructing it to a single-point urban interchange;
- A frontage road running along the west side of I-5 between NE 219th Street and Delfel Road/NE 209th Street intersection, providing local access and traffic circulation;
- A new four-lane limited access extension of SR 502 from the NE 10th Avenue/ NE 219th Street intersection (otherwise known as "Duluth") to I-5; and
- Construction of a new Park-and-Ride at a location east of I-5
- Access management along SR-502 between I-5 and Battle Ground
- Realignment of SR-502 and the NHS designation to NE 219th Street between I-5 and Battle Ground
- Widening of NE 179th Street in the interchange vicinity
- Realignment of NE 10th Avenue north of NE 179th Street to the east to allow for intersection spacing from the NE 179th Street ramps.

DM1425 = WSDOT Design Manual section 1425, which is the policy for the conduct of Access Decision Reports in Washington state.

Finding of operational acceptability is FHWA's approval of a new or modified access.

New and Modified Access on I-5 Between NE 179th Street and Ridgefield Interchanges

Access Decision Report

EXECUTIVE SUMMARY

The purpose of this *New and Modified Access Decision Report* is to provide the necessary information, evaluation, and recommendations to make a decision regarding the engineering feasibility of the proposed new and modified access for I-5 between the NE 179th Street interchange and the Ridgefield (otherwise known as the SR 501 or the Pioneer Street) interchange. The new and modified access consists of adding a new access point at approximately NE 219th Street (otherwise known as the SR 502 extension), and modernizing the NE 179th Street interchange by reconstructing it to a single-point urban interchange. This is recommended as the preferred operational alternative.

The two interchange access requests (NE 179th Street and NE 219th Street) are being combined into one report due to the regional trip interrelationships between the two interchanges. Additionally, the NE 219th Street interchange, if constructed first, could be used as part of the construction traffic management during the modification to the NE 179th Street interchange.

The intent of this report is to request access for a new interchange on I-5 at approximately NE 219th Street (SR 502), and modernizing the existing NE 179th Street interchange along I-5 in Clark County.

Background

This access decision report follows up on the previously completed I-5/I-205 North Corridor Study (*I-5/I-205 North Corridor Strategy Report,* February 2001). The I-5/I-205 North Corridor Study identified several safety and mobility deficiencies for regional trips to and from northeast Clark County on routes that lead to I-5, which all funnel onto SR 502 and through the NE 179th Street interchange. To address these deficiencies, the study recommended proceeding with an Access Decision Report for a proposed new interchange on I-5 between NE 179th Street and the Ridgefield interchange.

SR 502 is the National Highway System link between I-5 and northeast Clark County, and is an important commute, freight, and transit route for regional trips. The entire SR 502 corridor from I-5 at NE 179th Street to Battle Ground has been designated a High Accident Corridor, and this affects the regional trips between northeast Clark County and the rest of the region. These regional trips primarily travel to and from Portland, Central Vancouver, and north on I-5 to Cowlitz County. As growth has increased, congestion and accidents have increased in the SR 502 corridor, and portions of SR 502 are either currently deficient or projected to be deficient within ten years—level-of-service (LOS) E/F. Refer to **Figure 1** (at the end of this section) which depicts the study corridor.

The I-5 corridor from the NE 179th Street interchange south to the Interstate Bridge is also projected to be at LOS E/F by the year 2010. Current and future congestion levels and the high accident rate on I-5 between I-205 and NE 179th Street are made worse by the number of vehicles changing lanes in this section to exit/enter the mainline at NE 179th Street and at I-205. The section of I-5 between NE 134th Street and NE 179th Street, including the I-205 junction, is also designated a High Accident Corridor in the 1999-2018 Highway System Plan.

The I-5/179th Street interchange is projected to be deficient in the short term, despite recently constructed interim improvements. Year 2025 projections indicate PM peak period ramp queues would extend onto the I-5 mainline, increasing the risk of a higher accident rate on I-5.

The Ridgefield interchange to the north does not serve the northeast Clark County travel shed due largely to geographic barriers. However, it was analyzed as a part of this report because of its proximity within the corridor. Projected congestion at the interchange will result in queued ramp traffic for the northbound off-ramp onto the I-5 mainline by 2025 if improvements aren't made or another alternative isn't implemented to reduce the forecast number of trips at that interchange.

Regional transit trips are also affected by the increased congestion on SR 502 and with increased congestion at the I-5/NE 179th Street interchange. A future Park-and-Ride has been planned along the SR 502 corridor near I-5, to serve commuters from northeast Clark County. Buses using SR 502 between this Park-and-Ride and the I-5/179th Street interchange would experience significant delays due to forecast congestion levels on SR 502.

Study Area

The I-5 study corridor encompasses two interstate systems and is defined as the mainline of I-5 between the NE 99th Street and NW Pioneer Street/SR 501 interchange, along with the I-205 mainline between the NE 83rd Street/Padden Parkway interchange and the junction with I-5 north of NE 134th Street.

SR 502 serves the travel shed for a large portion of northeast Clark County, including Battle Ground and the SR 503 corridor north of Battle Ground. It is a two-lane arterial roadway with numerous driveways and at-grade intersections. **Figure 2** shows the travel shed for the existing NE 179th Street interchange (without a new interchange at NE 219th Street). **Figure 3** shows the travel shed for the proposed NE 219th Street (SR 502) interchange, serving regional trips to and from northeast Clark County. These are key origins and destinations so the percentages may not total 100 percent. Both of these figures (located at the end of this section), based on regional planning forecasts for the Year 2025, indicate that both the NE 179th Street and the new NE 219th Street interchange serve primarily regional trips. For the Year 2025, the total number of PM peak hour trips using the NE 179th Street interchange (with minor improvements and without a NE 219th Street interchange) is 3,470 trips, while the Year 2025 PM peak hour trips using the NE 219th Street interchange is 1,535 trips.

Essentially, the NE 219th Street interchange would be located approximately 1.5 to 2 miles north of the existing NE 179th Street interchange.

Purpose and Need

The primary purpose of this new and modified access proposal is to improve safety and regional mobility for the northeast Clark County travel shed by improving SR 502 as the primary arterial and as a National Highway System (NHS) route for regional trips. Specifically, the intent is to alleviate current and future safety and mobility deficiencies on SR 502 and ramp queuing at the existing NE 179th Street interchange. This can be accomplished by providing a new interchange on I-5 between the NE 179th Street and Ridgefield interchanges and improving the NE 179th Street interchange.

This project's objectives are to:

- Maintain or improve the integrity of traffic operations on the I-5 mainline and at existing interchanges on I-5; and
- Improve regional mobility between northeast Clark County and the rest of the Vancouver-Portland and Cowlitz County region.

Preferred Operational Alternative

Please refer to **Figures 4 through 7** (at the end of this section) for illustrations of the proposed preferred operational alternative (three options for the NE 219th Street interchange, one option for the NE 179th Street interchange). The proposed access modification on I-5 between NE 179th Street and Ridgefield interchanges includes:

- Adding a new diamond-style interchange at approximately NE 219th Street (otherwise known as the SR 502 extension) providing access both north and south on I-5;
- Modernizing the NE 179th Street interchange by reconstructing it to a single-point urban interchange;
- A frontage road running along the west side of I-5 between NE 219th Street and Delfel Road/NE 209th Street intersection, providing local access and traffic circulation and providing local access to the west side of the interchange;
- A new four-lane limited access extension of SR 502 from the NE 10th Avenue/ NE 219th Street intersection (otherwise known as "Duluth") to I-5; and
- Construction of a new Park-and-Ride at a location east of I-5.
- Access management along SR 502 between I-5 and Battle Ground.
- Widening of NE 179th Street in the interchange vicinity.
- Realignment of NE 10th Avenue north of NE 179th Street to allow for appropriate intersection spacing from the 179th interchange ramps.

Benefits of the Preferred Operational Alternative

The preferred operational alternative provides a range of benefits to the Interstate System, the NHS, and the region. Refer to conclusions of the various policy points. These benefits are:

- The 219th Street interchange, along with the SR 502 extension from I-5 to NE 10th Avenue improves mobility and safety for regional trips using the NHS route from I-5 to northeast Clark County.
- The modified access at the NE 179th Street interchange and reconfiguration to a single-point urban interchange improves mobility at the interchange and along the NE 179th Street corridor.
- The NE 219th Street interchange provides an improvement to traffic operations and safety in the critical section of I-5 between I-205 and NE 179th Street.
- With access management and the implementation of the county's proposed Interchange Area Management Policy, interchange area traffic operations as well as urban fringe land development policies will be protected.
- The region benefits from improvements to mobility and safety of regional commute, commerce, and transit trips between I-5 and northeast Clark County.

The analysis of the 219th Street interchange led to a conclusion that it would serve similar trip origins and destinations to the 179th Street interchange but a significantly different travel shed than the Ridgefield interchange. These interchanges operate somewhat independently from the NE 219th Street interchange. The analysis also showed that there are some inter-relationships between the NE 179th Street and 219th Street interchanges with regard to regional trips to and from northeast Clark County which use I-5, and that the 219th Street interchange would provide some relief to the 179th Street interchange. Additionally, constructing the NE 219th Street interchange as the first phase would enable it to be used for traffic management during the subsequent reconstruction of the NE 179th Street interchange. Therefore, access modifications for both the 179th Street and proposed 219th Street interchanges are included in this Access Decision Report.

Conditions of Approval

The Federal Highway Administration (FHWA) requires that the new interchange operate appropriately and that it will not spur unwarranted land use changes. Because the preferred operational alternative is to be located in a primarily rural area, and due to the desire to improve both safety and mobility for regional trips between I-5 and northeast Clark County using the SR 502 NHS corridor, there are certain conditions that are proposed to be implemented as part of FHWA's approval of this access modification. These proposed conditions of approval are:

As part of the approval of the 219th Street interchange, FHWA requires that Washington State Department of Transportation (WSDOT) maintain the integrity of traffic operations in the interchange vicinity. Additionally, the new interchange is not to spur unwanted or unmanaged growth along the 219th Street corridor to Battle Ground. Therefore, if the 219th Street interchange is approved, WSDOT will commit to these requirements by:

1. *Ensuring the integrity of interchange area traffic operations, and preservation of the NHS route (SR 502) into Battle Ground by an access management strategy to be implemented by providing full limited access control within 300 feet of the interchange ramp terminals and a combination of full and partial access control along 219th Street/SR 502. Modified limited access along the 219th Street/SR 502 corridor from I-5 to Battle Ground may be allowed where existing build out of adjacent properties makes partial control infeasible.*
2. *Working with Clark County to gain adoption and implementation of an interchange area management policy through the county's comprehensive plan. The county will be referred to the WSDOT access management requirements as outlined in the WSDOT Design Manual, Chapter 1420 and WSDOT's commitment to obtain full or partial access control along the corridor where possible.*
3. *Discouraging short trips and mitigating forecasts of mainline LOS E conditions by future considerations of northbound on-ramp meters from 99th Street, 134th Street, and 179th Street.*

Access Decision Criteria

This section summarizes the eight policy points that both the Washington State Department of Transportation and the Federal Highway Administration (FHWA) require to be addressed when proposing new or modified access on the Interstate System. An agreement between WSDOT and FHWA allows the report to focus on policy requirements incorporated in WSDOT's Design Manual Chapter 1425. This report responds to the DM1425 requirements. The full report detailing these eight points follows this Executive Summary and is structured to meet both the WSDOT and FHWA requirements. The technical memoranda that support the analysis and conclusions in this *Modified Access Decision Report* are contained in the Technical Appendices included at the end of the report.

Policy Point One: Future Interchanges

The preferred operational alternative is consistent with the I-5/I-205 Route Development Plan, I-5 Corridor Plan and surrounding network plans. The preferred operational alternative of a new interchange at NE 219th Street and a modified access at the existing NE 179th Street interchange will not negatively impact mainline or adjacent interchange operations.

The recently completed *I-5/I-205 North Corridor Study* developed a comprehensive freeway and adjacent arterial plan for the I-5 corridor. The Study analyzed this interchange and recommended moving forward with the Access Decision Report for new or modified access on I-5. This interchange was analyzed with respect to its impacts on adjacent interchanges, and potential benefits to existing interchanges.

Interchange modifications at the NE 134th Street interchange are being recommended as part of the separate *Modified Access Decision Report for I-5/NE 134th Street Interchange*. Analysis conducted as part of this report and the *Modified Access Decision Report for I-5/134th Street Interchange* indicates that the preferred operational alternatives for both reports will not negatively affect mainline or interchange operations at adjacent interchanges.

Several design options for the new interchange are being considered. During the next project phase, which will produce a decision-making environmental document consistent with the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA), the preferred design alternative will be chosen. The NE 219th Street interchange was analyzed with an "influence area," which is essentially the north and south limits of where this interchange would be located. These limits were analyzed with regard to freeway operations and impacts on adjacent interchanges. The limits for the NE 219th Street influence area are from approximately NE 209th Street to approximately 1,000 feet north of NE 219th Street on I-5.

Within this influence area, the new interchange would be located between 1.5 and 2 miles from the NE 179th Street interchange and between 2.2 and 2.5 miles from the Ridgefield interchange. Traffic operations were analyzed with respect to the I-5 study corridor using these limits for the NE 219th Street interchange. The analysis indicated that the interchange would be compatible with the comprehensive network plan at any of the design locations currently being considered. The interchange spacing has been determined to be adequate for the new interchange, and there is no negative impact on traffic operations of the I-5 mainline and at adjacent interchanges. The preferred operational alternative serves to alleviate queuing at adjacent interchanges.

Policy Point Two: Land Use and Transportation Plans

The preferred operational alternative is consistent and compatible with local, regional, and state plans.

Both the 179th Street and the NE 219th Street interchanges are consistent with local, regional, and state plans. Local plans include the Clark County Comprehensive Growth Management Plan and the Arterial Atlas, which is a component of the Comprehensive Plan that serves as the local arterial plan. The 179th and 219th interchanges are included in the Arterial Atlas. Although it is not incorporated into the land use element of the Comprehensive Plan, current and proposed growth and planning policies will serve to protect and manage the interchange area.

Regional plans include the Metropolitan Transportation Plan (MTP) and the State Air Quality Implementation Plan (SIP) for Clark County. The NE 219th Street interchange is included in the MTP, which identifies it as a priority project for planning, design, and right-of-way acquisition. Although the new interchange is not included in the 10-year network for air quality modeling, it is included in the air quality conformity analysis for the MTP that was conducted as part of the SIP air quality analysis requirements.

Statewide Plans include the Washington Transportation Plan (WTP) and the Highway System Plan (HSP). The NE 219th Street interchange and the SR 502 extension to I-5 are both included in the HSP, which is an element of the WTP. The WTP is currently under development.

Policy Point Three: Reasonable Alternatives

The alternatives which do not add or modify access along I-5 do not significantly benefit I-5 mainline traffic to improve mobility for regional trips to and from northeast Clark County, and do not alleviate short- and long-term operational and safety issues on the SR 502 National Highway System route between I-5 and Battle Ground. These alternatives have little or no improvement to the High Accident Corridor on I-5 between I-205 and NE 179th Street.

The Access Decision process requires the examination of reasonable local improvement alternatives, in lieu of new or modified access to I-5 and I-205. This analysis must demonstrate that existing interchanges and/or local roads and streets in the corridor can neither "provide the necessary access, nor be improved to satisfactorily accommodate the design-year traffic demands, while at the same time providing the access intended by the proposal" (FHWA guidance, Federal Register, 1998).

All reasonable interstate and local system alternatives were developed and analyzed to respond to the issues identified in the problem statement. Specifically, each alternative was tested for its ability to improve regional mobility to and from northeast Clark County and alleviate future ramp queues and congestion at existing I-5 interchanges.

Several alternatives which did not add or modify access along I-5 were developed and analyzed, including widening the existing interchange ramps at adjacent interchanges; local system improvements, including new crossings of I-5 and widening of SR 502 between I-5 and Battle Ground; and five lane improvement alternatives on various other east-west arterials.

Major improvements to the existing 179th Street interchange were also tested. These included reconstructing the interchange to a single-point urban interchange, and also providing for direct access "flyover" ramps to and from I-5 directly connecting to SR 502 north of NE 179th Street. SR 502 would be widened to four travel lanes with a center median or left turn lane, with access management, between I-5 and Battle Ground under this alternative. The analysis also indicated that the modification of the NE 179th Street interchange to a Single Point Urban Interchange (SPUI) is beneficial and necessary to accommodate Year 2025 demand, in concert with the NE 219th Street interchange. Thus, the NE 179th Street SPUI is a component of the preferred operational alternative.

The local improvement alternatives which do not add I-5 access did not benefit I-5 mainline traffic, nor do they reduce the amount of lane-changing occurring on the I-5 section between I-205 and NE 179th Street. While they do help to reduce the short- and long-term ramp queuing issues at existing interchanges on I-5, they do little to improve transit and freight mobility in northeast Clark County. They also do not improve mobility or safety deficiencies on SR 502 for regional trips to and from northeast Clark County.

While the "Improve NE 179th Street interchange" alternatives provide improvements for regional trips using SR 502, they do not improve mobility or safety deficiencies on SR 502 between NE 179th Street and NE 219th Street. These alternatives will not alleviate projected LOS deficiencies and current and future high accident rates on SR 502, compromising the integrity of SR 502 as a NHS route between I-5 and Battle Ground, and decrease its ability to serve regional trips along that corridor.

These alternatives do not reduce trips on I-5, nor do they alleviate projected LOS deficiencies on the I-5 mainline. These alternatives actually exacerbate traffic weaving in the critical section of I-5 between I-205 and NE 179th Street by reducing the length of the weaving section, especially with a southbound on-ramp flyover. This does not alleviate the current and future mobility and safety deficiencies in this section. Major improvements to SR 502 to provide additional capacity and reduce accidents by limiting access are difficult to achieve without significantly impacting the surrounding community.

The cost of improving SR 502 between NE 179th Street and NE 219th Street (including interchange improvements at I-5) are higher than the cost of a new 219th Street interchange. The benefit/cost ratio for the new interchange is higher than for SR 502 improvements.

All of the reasonable local improvement alternatives which did not modify or add access on I-5 were eliminated because they:

- Do not improve mobility or safety deficiencies on SR 502 for regional trips to and from northeast Clark County that access modification alternatives;
- Do not reduce the amount of lane-changing occurring on I-5 between I-205 and NE 179th Street and, thus, do not alleviate future congestion and safety deficiencies on that section of Interstate; and
- Do not provide significant improvements to transit and freight mobility in northeast Clark County.

Policy Point Four: Need for the Access Point Revision

The review of improvement alternatives which do not add and modify access along I-5 concluded that these improvements alone would not resolve the deficiencies outlined in the project's purpose and need. The preferred operational alternative is needed to best resolve current and future safety and mobility deficiencies.

The *I-5/I-205 North Corridor Study* as well as local and regional planning studies have all indicated that the existing interchanges, the SR 502 corridor between I-5 and northeast Clark County, and the I-5 mainline in the NE 179th Street interchange vicinity will become deficient before the Year 2025.

The primary purpose of this new and modified access proposal is to improve safety and regional mobility for the northeast Clark County travel shed by improving SR 502 as the primary arterial and as an NHS route. Specifically, the intent is to alleviate current and future safety and mobility deficiencies on SR 502. This can be accomplished by providing a new interchange on I-5 between the NE 179th Street and Ridgefield interchanges and improving the NE 179th Street interchange with modified access at I-5.

The current and future deficiencies in this corridor are volume exceeding capacity and a high accident rate. These deficiencies were created in part by ramp spillover onto the I-5 mainline from the NE 179th Street interchange, and by a large traffic volume weaving in the segment between the NE 179th Street interchange and I-205 in both directions. Alleviating these existing deficiencies will reduce current and future travel time delays on the primary route for regional

trips to and from northeast Clark County using I-5. Additionally, a new interchange is expected to alleviate accident recurrence and risk on the section of SR 502 between NE 179th and NE 219th Streets; while there may be a slight increase in accidents on I-5 due to the higher traffic volumes using that facility, the number and severity of overall accidents in the study area is expected to be reduced.

The review of local system improvement alternatives as well as improving the existing interchange ramps concluded that these improvements alone would not resolve the deficiencies outlined in the project's purpose and need. Therefore, to alleviate the interchange deficiencies and to protect the integrity of traffic operations in the interchange vicinity, recommended improvements which includes new and modified interstate access is being recommended as the preferred operational alternative. This would be accomplished by providing a new interchange at approximately NE 219th Street (otherwise known as the SR 502 extension), and modernizing the existing NE 179th Street interchange by reconstructing it to a single-point urban interchange.

Policy Point Five: Access Connections and Design

The proposal provides fully directional interchanges connected to public roads which are spaced appropriately, and the design meets full design level geometric control criteria.

The requirements for Policy Point 5 of the Access Decision Report are to show that the proposed new or revised access can be designed to meet or exceed current standards for the Interstate System. It has been determined that the proposed access in the preferred operational alternative can be constructed to full interstate standards as described in the WSDOT Highway Design Manual and the AASHTO Policy on Geometric Design of Highways and Streets.

The new NE 219th Street interchange is being designed to provide a fully-directional interchange. Access to the east is provided by the realigned SR 502, while access to the west is provided by a frontage road which connects to NE 209th Street (which continues to the west) at Delfel Road (which continues to the south).

Issues such as interchange spacing, ramp configuration, weave distances, and traffic projections were identified to allow an operational review of the proposed build option necessary to maintain an acceptable level of service (LOS) over the 20-year design period.

Policy Point Six: Operational and Accident Analyses

Under the operational and accident analysis, the proposed preferred operational alternative provides maximum safety and operational benefits for the I-5 and SR 502 corridors now and for the next 20 years.

A combination of analytical models was used to evaluate traffic operations in the study area and in the interchange vicinity. These models, calibrated to existing conditions, used Year 2005 and 2025 travel demand volumes generated by the Regional Transportation Council's regional travel model to analyze alternatives. Measures of effectiveness included travel time, delay, speed, vehicle density, and LOS.

Accident analysis included examination of the existing High Accident Corridors on I-5 and SR 502, and predominant accident types and causes. It has been determined that the primary

cause of accidents in the section of I-5 between I-205 and NE 179th Street is vehicles changing lanes between the two interchanges. The primary cause of accidents on SR 502 is frequent at-grade driveway accesses and intersections along the corridor.

Alternatives were evaluated with respect to their ability to alleviate weaving on I-5 or reduce volumes (and thus traffic conflicts) on SR 502 (NE 10th Avenue), which in turn should reduce the number of accidents in these corridors.

The conclusions reached are:

- For northbound traffic, only the alternatives which include both the NE 179th Street single-point urban interchange and the NE 219th Street interchange would lessen the weaving (compared to the no-build and other alternatives).
- For southbound traffic, the NE 179th single-point urban interchange (SPUI) and NE 179th flyover options increase weaving in the peak direction, due to a higher level of traffic using the interchange than in the no-build alternative. The weaving percentage is reduced (compared to the no-build alternative) only for the NE 219th Street interchange alternatives. The 219th Street interchange more than offsets any additional traffic added to the southbound direction due to the NE 179th Street SPUI.
- For corridor accidents on I-5 and SR 502, in the NE 219th interchange alternatives, there is a significant shift of traffic from the existing SR 502 alignment (between NE 179th Street and NE 219th Street) onto I-5, because traffic currently uses the I-5 mainline to access NE 219th Street. Theoretically, shifting volumes from a facility with a higher accident rate (SR 502) to one with a lower accident rate (I-5) should reduce the overall number of accidents in the corridor.

Thus, it can be concluded that under the safety analysis, the only alternative that provides maximum safety benefits is the preferred operational alternative.

Policy Point Seven: Coordination

All coordinating projects are contained in the mobility element or Safety Element of the Highway System Plan. Funding is being sought to construct the preferred operational alternative. The preferred operational alternative is in conformance with local, regional, and state land use and concurrency ordinances.

Funding is currently available for preliminary engineering and right-of-way acquisition for the NE 219th Street interchange, pending approval of this report by FHWA. Both the NE 219th Street interchange and NE 179th Street interchange improvements are contained in the Washington HSP. Safety and access management projects along SR 502 are contained in the Safety element of the HSP. Funding is being sought to construct the preferred operational alternative.

There are no current land use or development proposals under consideration with respect to this interchange.

The project's Steering Committee and Technical Advisory Committee provided agency coordination. A public involvement process provided outreach and opportunities for public input on study findings and design alternatives.

The most significant aspect of coordination for this project will be between FHWA, Clark County, WSDOT, and the City of Battle Ground. Clark County has Comprehensive Plan and land use jurisdiction in the vicinity of the interchange. Currently, the Comprehensive Plan designation is primarily rural and agricultural surrounding the interchange. The County is considering an interchange area management policy that will provide for mitigation should there be a change in the Comprehensive Plan designation(s) in the interchange vicinity. This should protect the integrity of traffic operations on I-5, the NE 219th Street interchange, and SR 502.

WSDOT has jurisdiction over access on SR 502, and is planning for full access control between I-5 and NE 10th Avenue, and managed access between NE 10th Avenue and Battle Ground. This should protect traffic operations in the interchange area by limiting access and vehicle conflicts.

The City of Battle Ground considers the interchange important for regional commute trips and commerce between its urban area and I-5. The recently completed *I-5/I-205 North Corridor Study* analyzed this interchange and recommended moving forward with the Access Decision Report for new and modified access on I-5.

Policy Point Eight: Planning and Environmental Process

An environmental analysis was completed as part of the operational study of this interchange, and the appropriate NEPA document will be prepared after FHWA approval of the modified access request. The preferred operational alternative is consistent with local planning requirements. Impacts to the environment will be mitigated consistent with local, state, and federal regulations.

The project team conducted an environmental alternatives analysis as a preliminary environmental screening of alternative design options evaluated in this report.

The proposed access modification is expected to require potential environmental impact mitigation that will need to be addressed in the environmental document and project design, including wetlands replacement, culvert upgrades, potential cultural resources sites, and hazardous material sites.

As described in Policy Point 2, the proposed access modification is consistent with local planning requirements. A full analysis of environmental impacts will be undertaken at a later planning stage to comply with applicable federal, state, and local regulations. The preferred operational alternative is expected to have potential impacts on land use, air quality, wetlands, water resources, and vegetation.

Figure 1. I-5 Between 179th Street and Ridgefield Study Area

Figure 2. 179th Street Interchange Year 2025 PM Trip Origins and Destinations

Figure 3. 219th Street Interchange Year 2025 Trip Origins and Destinations

Figure 4. 219th – Preferred Operational Alternative (Option A)

Figure 5. 219th – Preferred Operational Alternative (Option B)

Figure 6. 219th – Preferred Operational Alternative (Option C)

Figure 7. 179th Interchange – Preferred Operational Alternative

POLICY POINT ONE: FUTURE INTERCHANGES

Washington State Department of Transportation (WSDOT) DM1425 Policy: Is the proposed access point revision compatible with a comprehensive (freeway) network plan?

The guidance for Policy Point One is to document plans for all future interchange additions that may affect the decision to allow a new access on I-5 at approximately NE 219th Street, and allowing modified access at the existing NE 179th Street Interchange. The intent of the policy is to provide a comprehensive interstate network analysis, with recommendations that address all proposed and desired access. The intent is to provide a comprehensive interstate network analysis, with recommendations that address all proposed and desired access. New interchange proposals must be reviewed to ensure that they do not negatively impact traffic operations at adjacent interchanges, nor the interstate mainline.

This analysis concluded that the preferred operational alternative will not negatively affect mainline or interchange operations at the adjacent interchanges.

I-5 Network Plan

The I-*5/I-205 North Corridor Study* developed a long-range freeway plan for I-5 and I-205 and a network plan for the adjacent local arterial system. It recommended moving forward with the access decision study for a proposed NE 219th Street interchange and a modification to the existing NE 179th Street interchange. No other access modification is recommended. Interchange modifications at the NE 134th Street interchange are being recommended as part of the *Modified Access Decision Report for I-5/NE 134th Street Interchange*. Analysis conducted as part of this report and the separate *Modified Access Decision Report for I-5/134th Street Interchange* indicates that the preferred operational alternatives for both reports, in concert with each other, will not negatively affect mainline or interchange operations at adjacent interchanges.

Several design options for the new interchange are being considered. During the next project phase, which will produce a decision-making environmental document consistent with the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA), the preferred design alternative will be chosen. The NE 219th Street interchange was analyzed with an "influence area," which is essentially the north and south limits of where this interchange would be located. These limits were tested with regard to freeway operations and impacts on adjacent interchanges. The limits for the NE 219th Street influence area are from approximately NE 209th Street to approximately 1,000 feet north of NE 219th Street on I-5.

Within this influence area, the new interchange would be located between 1.5 and 2 miles from the NE 179th Street interchange and between 2.2 and 2.5 miles from the Ridgefield interchange. Traffic operations were analyzed with respect to the I-5 study corridor using these limits for the NE 219th Street interchange. All design considerations have the new interchange being connected with NE 209th Street/Delfel Road to provide access to and from points west of I-5, and are also connected with SR 502 (NE 219th Street/10th Avenue) to provide access to and from points east of I-5.

The analysis indicated that the interchange would be compatible with the comprehensive network plan at any of the design locations currently being considered. The interchange spacing has been determined to be adequate for the new interchange, and there is no negative impact on traffic operations.

The analysis of the 219th Street interchange led to a conclusion that it would serve similar trip origins and destinations to the 179th Street interchange but a significantly different travel shed than the Ridgefield interchange. These interchanges operate somewhat independently from the NE 219th Street interchange. The analysis also showed that there are some inter-relationships between the NE 179th Street and 219th Street interchanges with regard to regional trips to and from northeast Clark County which use I-5, and that the 219th Street interchange would provide some relief to the 179th Street interchange. Additionally, constructing the NE 219th Street interchange as the first phase would enable it to be used for traffic management during the subsequent reconstruction of the NE 179th Street interchange. Therefore, access modifications for both the 179th Street and proposed 219th Street interchanges are included in this Access Decision Report.

Policy Point One Conclusions

The preferred operational alternative is compatible and consistent with the comprehensive freeway plans for I-5 and I-205 in the study corridor. The preferred operational alternative will not negatively affect mainline or interchange operations at the adjacent interchanges. Interrelationships between the NE 219th Street interchange and the NE 179th Street interchange led to including access modification requests for both interchanges in a single report.

POLICY POINT TWO: LAND USE AND TRANSPORTATION PLANS

WSDOT DM1425 Policy: Is the proposed access point revision compatible with all land use and transportation plans for the area?

The guidance for Policy Point Two is to show that the proposal ensures consistency with local and regional land use and transportation plans. The report should:

- Describe how the proposed design and access modifications are consistent and compatible with local and regional land use/transportation plans, including the statewide transportation plan;
- Demonstrate that secondary land use impacts caused by future development at a new interchange area would be incorporated into the design and operational analysis or that the proposal will not generate secondary land use impacts.
- Discuss the corridor improvement recommendations' consistency with Washington State Highway System Plan (HSP) policies.

This analysis concluded that the preferred operational alternative is consistent and compatible with local, regional, and state plans.

Appendix A contains the Plan Consistency technical memorandum that supports this policy point.

Policy that seeks to integrate access management and land use is collectively referred to as Interchange Area Management. Effective Interchange Area Management preserves the functional integrity of a roadway system and allows efficient access to and from abutting properties, while serving the desired land use objectives of the local community or region. Interchange Area Management policies must be supported through consistent implementation of companion development ordinances that provide standards for orderly land development.

For this modified access request, Clark County and WSDOT are working together to develop interchange area management policies and practices to protect the long-term integrity of this interchange. Access management implementation along the SR 502 corridor between I-5 and Battle Ground is necessary to protect the integrity of the National Highway System (NHS) corridor serving regional trips between I-5 and northeast Clark County as well as protecting the integrity of the interchange traffic operations.

The following is a summary of all related planning documents.

Transportation and Land Use Plans

Existing Local, State, and Regional Plans

Local Plans

The following plans and studies provide background, history, policy direction, and/or support for the modified access proposal at NE 179th Street and new access at NE 219th Street:

- *Clark County Comprehensive Growth Management Plan (1994)*: This project must be consistent with several elements of the Comprehensive Growth Management plan, including: Transportation (e.g., roads, functional classifications, other transportation facilities), Land Use (e.g., urban growth boundaries, comprehensive plan designations, zoning), Economic Development (e.g., types of development, accommodating future growth); and Capital Facilities (e.g., supporting the capital facilities identified in the Comprehensive Plan; consistency with funding projections). The preferred operational alternative reflects the land use characteristics of the Land Use element of the Comprehensive Plan. It is included in the Arterial Atlas, the transportation plan element of the Comprehensive Plan. This plan is currently being updated and the results of the access decision study are being addressed in the plan update. The plan has identified the needs to modernize the NE 179th Street interchange and to construct the NE 219th Street interchange.
- *Comprehensive Plan Consistency Determination*: Clark County has determined that the preferred operational alternative is consistent with the Comprehensive Plan.
- *Clark County's Salmon Creek/Fairgrounds Regional Road Plan (SCFGRRP - 1997)*: The need for revised access was first studied in this plan, which was a subarea study conducted by Clark County to examine current and future road congestion and alternatives for relief. A focal point of the study was NE 179th Street. The horizon year for that study was 2017. The study focused on the weekday PM peak hour. Land use information came from the existing Comprehensive Plan zoning designations. The SCFGRRP determined that the modifications to the NE 179th Street interchange are necessary to achieve congestion relief and result in a LOS D along NE 179th Street.
- *Transportation Improvement Programs*: Widening of NE 179th Street both east and west of the NE 179th Street interchange is identified in Clark County's 2001-2006 Transportation Improvement Program (TIP). Planning for the NE 219th Street interchange is also included in the 2001-2006 Statewide Transportation Improvement Program. Construction of the new interchange and NE 179th Street interchange improvements, ramp modifications, a new Park-and-Ride, and widening and access management on SR 502 east of NE 10th Avenue have not yet been added to local and/or state TIPs pending the outcome of this report.

Regional Plans

- *State Air Quality Implementation Plan (SIP) for Clark County*: This plan demonstrates how Clark County will maintain its compliance with air quality standards. The interchange improvements and access modification of the preferred operational alternative are contained in the transportation network which was modeled under air quality regulations to ensure conformity with air quality standards.
- *Metropolitan Transportation Plan (MTP)*: The Southwest Washington Regional Transportation Council maintains this plan, which serves as the long-range transportation plan for the regional transportation system. Improvements to the I-5 corridor, including the modification of the NE 179th Street interchange and the new NE 219th Street interchange, are identified as one of the highest regional funding priorities for the MTP.
- *Regional Transportation Council Board Approval*: The RTC Board, at their January 2002 meeting, adopted a resolution in support of this access modification request.

State Plans

- *Washington State Growth Management Act (GMA)*: The Washington State Office of Financial Management (OFM) is responsible for developing planning-horizon year projections of population and employment used for traffic projections. The county-wide totals of projected population and employment are to be used for local and regional planning in Clark County. Allocations to urban growth areas (UGAs) and traffic analysis zones (TAZs) are the responsibility of Clark County as the lead agency, with support from the cities within Clark County and the Southwest Washington Regional Transportation Council (RTC). Improvements to the NE 134th Street interchange are included in the transportation element of the Clark County Comprehensive Plan, with the exception of the NE 139th Street crossing of I-5, which would require a Comprehensive Plan amendment.
- *I-5/I-205 North Corridor Study (January 2001)*: This study recommended proceeding forward with the access decision study for the proposed 219th Street interchange, as well as interchange modifications at the NE 179th Street interchange, similar to the proposed design options which provided a basis for this report.
- *State Highway System Plan (HSP)*: The 1999-2018 HSP identified a new 219th Street/ SR 502 interchange with I-5 and improvements to the NE 179th Street Interchange. The new 2001-2020 HSP incorporates the recommendations of the I-5/I-205 North Corridor Study.

Consistency with Established Plans

This section will review how existing plans are accommodating the modified access project at the NE 179th Street interchange and new access at NE 219th Street.

Urban Growth Area

The Urban Growth Area (UGA) was established as part of the adoption of the Comprehensive Growth Management Plan in 1994. This area contains the land needed to accommodate 20-year urban growth. The Vancouver UGA includes the 179th Street interchange but does not include the NE 219th Street proposed interchange. No UGA changes are anticipated as a result of new access at the NE 219th Street interchange.

Land Use/Zoning Plans

The NE 179th Street interchange is fully contained within the Vancouver UGA. The area surrounding the proposed NE 219th Street interchange is primarily rural residential and agricultural. The county is considering an interchange area management policy which would provide for full mitigation of traffic impacts for any comprehensive plan amendment within a half-mile radius of an interchange. Thus, there are no known comprehensive plan consistency issues regarding the land use impacts of interchange improvements.

Secondary Land Use Impacts

With full implementation of the preferred operational alternative, the transportation system will have the capacity to accommodate the projected 20-year economic and traffic growth that the NE 179th Street and NE 219th Street interchanges will serve. The area surrounding the NE 219th Street interchange is currently rural and agricultural in nature and use, and the Comprehensive Plan does not call for changes in these uses. WSDOT plans to undertake an access management project along the SR 502 corridor between I-5 and Battle Ground as part of the approval for the new 219th Street interchange. Clark County is considering an Interchange Area Management policy whereby any future land use or comprehensive plan changes would fully mitigate their transportation impacts on these interchanges.

Transportation Plans

The NE 219th Street interchange is consistent with local, regional, and state plans. Local plans include the Clark County Comprehensive Growth Management Plan and the Arterial Atlas, which is a component of the Comprehensive Plan that serves as the local arterial plan. The interchange is included in the Arterial Atlas. Although it is not incorporated into the land use element of the Comprehensive Plan, current and proposed growth and planning policies will serve to protect and manage the interchange area.

NE 179th Street interchange access modifications are consistent with the Clark County Comprehensive Growth Management Plan, the Metropolitan Transportation Plan, and the Highway System Plan.

Access Management

FHWA requires that the new interchange operate appropriately and that it will not spur unwarranted land use changes. Because the preferred operational alternative is to be located in a primarily rural area, and due to the desire to improve both safety and mobility for regional trips between I-5 and northeast Clark County using the SR 502 NHS corridor, WSDOT plans to implement access management along the SR 502 corridor between I-5 and Battle Ground. This

would be a combination of full and partial access control, except where infeasible due to current build-out of surrounding land, modified control (such as combining driveways or partial turn restrictions) is acceptable to WSDOT. Additionally, WSDOT is working with Clark County to gain adoption and implementation of an interchange area management policy through the County's Comprehensive Plan.

Consistent Identification of Operational Deficiency

The findings from this study which proposes a preferred operational alternative is consistent with those findings from previous planning efforts. These studies included those conducted by WSDOT (I-5/I-205 North Corridor Study, Highway System Plan), Clark County (Salmon Creek/Fairgrounds Regional Road Plan), and the Regional Transportation Council (Metropolitan Transportation Plan) have all identified mobility and safety deficiencies on I-5 and on SR 502 and a need for improvements at the NE 179th Street interchange as well as planning for a future NE 219th Street interchange.

Transit/Transportation System Management Strategies (TSM) Explored

The *I-5/I-205 North Corridor Study* and the *NE 179th Street to Ridgefield Modified Access Study* both examined transit and transportation system management (TSM) alternatives at the NE 179th Street and NE 219th Street interchanges. Transit options included a new Park-and-Ride in the vicinity of the southeast quadrant of the NE 219th Street/I-5 interchange as well as one at the NE 179th Street interchange. These were included in the operational analysis. TSM options included additional turn lanes on the existing NE 179th Street interchange ramps and intersection safety improvements along SR 502 between I-5 and Battle Ground. Neither the transit nor the TSM alternatives were able to meet the Purpose and Need requirements, and neither was able to fully resolve the safety and mobility deficiencies on SR 502 between NE

179th Street and NE 219th Street. TSM elements included in the preferred operational alternative include a potential Park-and-Ride located along NE 219th Street east of I-5, future consideration of ramp metering at the NE 134th Street and NE 179th Street northbound on-ramps to alleviate projected mainline deficiencies and to discourage short trips on the I-5 mainline, and safety improvements along SR 502.

Policy Point Two Conclusions

The preferred operational alternative is consistent and compatible with local, regional, and state plans. Local plans include the Clark County Comprehensive Growth Management Plan and the Arterial Atlas, which is a component of the Comprehensive Plan that serves as the local arterial plan. The interchange is included in the Arterial Atlas. Although it is not incorporated into the land use element of the Comprehensive Plan, current and proposed growth and planning policies will serve to protect and manage the interchange area. A letter with a finding of consistency is included in Appendix A.

Regional plans include the Metropolitan Transportation Plan (MTP) and the State Air Quality Implementation Plan (SIP) for Clark County. The NE 219th Street interchange is included in the MTP, which identifies it as a priority project for planning, design, and right-of-way acquisition. Although the new interchange is not included in the 10-year network for air quality modeling, it is included in the air quality conformity analysis for the MTP that was conducted as part of the SIP air quality analysis requirements. A resolution from the RTC Board is included in Appendix A.

Statewide Plans include the Washington Transportation Plan (WTP) and the HSP. The NE 219th Street interchange and the SR 502 extension to I-5 are both included in the HSP, which is an element of the WTP. The WTP is currently under development.

Planning for this Access Decision Report, including the land use forecasts, urban growth area boundaries, and comprehensive plan considerations, were conducted under the best information available to the study at this time. The Comprehensive Plan policies strongly encourage urban infill and densities and also rural preservation. Clark County has determined that these assumptions are consistent with the Comprehensive Plan.

POLICY POINT THREE: REASONABLE ALTERNATIVES

WSDOT DM1425 Policy: Have all reasonable alternatives been assessed and provided for?

The Access Decision process requires the examination of reasonable local improvement alternatives, in lieu of new or modified access to I-5 between NE 179th Street and Ridgefield. This analysis must demonstrate that existing interchanges and/or local roads and streets can neither "provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal" (FHWA guidance, Federal Register, 1998). Also required is an evaluation to ensure that TSM strategies (e.g., ramp metering, mass transit, and HOV facilities) have been assessed and included in the alternatives, if currently justified, or could be accommodated if a future need is identified.

This analysis concluded that the preferred operational alternative is the only alternative which satisfies the project purpose and need.

Table 1 on Page 36 summarizes existing (1998), short-term (2005), and long-term (2025) level of service for sections of I-5 and I-205 in the study area under no-build and various improvement alternatives. "Local improvements" in this table do not add or modify I-5 access. The table also summarizes northbound off-ramp queue lengths for the existing I-5 and I-205 ramps.

Several alternatives which did not add or modify I-5 access were developed and analyzed. These included:

- Improve Existing Interchanges: widen existing ramps and add turn lanes at the ramp termini at the NE 179th Street and Ridgefield interchanges.
- Transit improvements (new Park-and-Ride, high level of bus service), and TSM improvements such as intersection improvements and traffic signal coordination.
- Local Improvements: new crossings of I-5 at NE 139th Street, NE 154th Street, NE 209th Street, and NE 262nd Street; widening of NE 72nd Avenue to 5 lanes, NW 11th Avenue to three lanes, widening SR 502 to five lanes with access management improvements between I-5 and Battle Ground; and other five-lane arterial improvement alternatives for NE 179th Street, NE 199th Street, and NE 239th Street between NE 10th Avenue/SR 502 and SR 503. These are depicted in Figure B-7 in Appendix B.

Major improvements to the existing 179th Street interchange were also tested. These included reconstructing the interchange to a single-point urban interchange, and also providing for direct access "flyover" ramps to and from I-5 directly connecting to SR 502 north of NE 179th Street. SR 502 also would be widened to five lanes, with access management, between I-5 and Battle Ground under this alternative.

Alternatives were developed with the intention of reducing congestion at existing interchanges on I-5, reducing mainline congestion, reducing the amount of traffic maneuvers occurring on the

section of I-5 between I-205 and NE 179th Street, and providing improvements on the arterial system to improve mobility and safety for regional trips between I-5 and northeast Clark County.

Modified and new access alternatives were also developed. These consisted of major reconfiguration of the NE 179th Street interchange; providing for direct-access "flyover" connections between I-5 and SR 502; a new 209th Street crossing combined with improvements at NE 179th Street; a new NE 199th Street interchange; and a new NE 219th Street interchange, which was tested at various locations between NE 209th Street and NE 219th Street.

All of the reasonable local improvement alternatives which did not add or modify I-5 access, and those which significantly modified existing interchanges, were eliminated because they:

- Do not improve mobility or safety deficiencies on SR 502 for regional trips to and from northeast Clark County as compared to the preferred operational alternative;
- Do not reduce the amount of lane-changing occurring on I-5 between I-205 and NE 179th Street (only the NE 219th Street interchange lessens the lane-changing in this section by moving the weaving north of 179th Street) and, thus, do not alleviate future congestion and safety deficiencies on that section of Interstate; and
- Do not provide significant improvements to transit and freight mobility in northeast Clark County.

Appendix B contains the technical memorandum summarizing the local improvement alternatives analysis in greater detail. Tables B-1 in Appendix B and C-4 in Appendix C summarize the alternative analyses results in detail.

Existing Conditions (1998)

The 179th Street interchange is operating at a peak period level-of-service C/D. SR 502 between I-5 and Battle Ground is an existing high accident corridor and operates at LOS D conditions along most of its length.

The section of I-5 between I-205 and 179th Street operates at approximately LOS C in the AM peak (southbound) and LOS D in the PM peak (northbound). North of NE 179th Street, I-5 operates at approximately LOS C.

The section of I-5 between 134th Street and in the vicinity of the 179th Street interchange is also a High Accident Corridor. The section of the corridor between I-205 and NE 179th Street experiences predominantly sideswipe and rear-end accidents, attributable to vehicles changing lanes to enter or exit I-5 at NE 179th Street and at I-205 (see **Figure 8** which depicts this existing weaving movements on I-5).

Short-Term Outlook (2005 – 2010) No-Build

SR 502 is projected to be at LOS E (deficient) by the year 2010, and WSDOT has planned some spot safety improvements at High Accident Locations along the corridor. However, planned access management projects do not have the benefit-to-cost ratio that would justify their being implemented as a stand-alone project, and would likely be undertaken as part of the NE 219th

Street interchange project. Congestion and the number of accidents attributable to at-grade intersections and driveway access will increase as traffic volumes increase.

Based on the 2005 (opening year) travel forecasts, it is likely that future increases in traffic volume will cause the I-5 sections between I-205 and 179th Street to become deficient (falling below congestion standards) within eight to ten years. At this point, the corridor would be operating at LOS E conditions, and as the 179th Street interchange and the SR 502 corridor as well as northeast Clark County continue to grow, the congestion levels and ramp queues at the NE 179th Street interchange will also continue to grow. Ramp queues may at peak times extend onto the I-5 mainline; these are expected to be the result of weekday peak traffic as well as being associated with events at the adjacent Clark County Fairgrounds, which are to become more frequent with expansion of the number of events occurring at the fairgrounds and with the new amphitheatre. Policy Point Six of this report includes figures which graphically show LOS and queuing in the future conditions.

Long-Term Outlook No-Build

SR 502 is projected to be at LOS F (deficient) by the year 2025, and WSDOT has planned major corridor widening and modified limited access control along the enter corridor as part of the HSP. However, planned access management projects are likely impractical due to significant right-of-way and property impacts and cost. Congestion and the number of accidents attributable to at-grade intersections and driveway access will increase as traffic volumes increase.

Based on the 2025 travel forecasts, it is projected that future increases in traffic volume will cause the I-5 sections between I-205 and 179th Street to become deficient (falling below level-of-service standards) by 2025. At this point, the corridor would be operating at LOS E or F conditions, and as the 179th Street interchange and the SR 502 corridor as well as northeast Clark County continue to grow, the congestion levels and ramp queues at the NE 179th Street interchange will also continue to grow. Ramp queues are projected to extend onto the I-5 mainline during weekday peak periods regardless of whether or not there are events at the fairgrounds. Year 2025 traffic volumes were increased approximately 200 peak hour vehicles to include peak hour traffic contributions by fairgrounds/amphitheatre events.

Figure 9 shows current (1999) and long-term projected (2025) deficiencies on I-5 and at the 179th Street interchange. Year 2025 PM peak hour volumes for the no-build and preferred operational alternatives are contained at the end of Appendix E.

Alternatives Analysis

All reasonable interstate and local-system alternatives were analyzed to respond to the issues identified in the problem statement. All alternatives were tested with and without the recommended preferred operational alternative at the 134th Street interchange. Specifically, each alternative was tested for its ability to improve regional mobility to and from northeast Clark County and alleviate future ramp queues and congestion at existing I-5 interchanges. There are:

- Minor improvements to existing interchanges;

- Local improvements;
- Major improvements to the NE 179th Street interchange;
- SR 502 alternatives; and
- NE 219th Street interchange.

Table 1. Existing and Projected Levels-of-Service and Queuing on I-5 and I-205

	PM Peak	2005 PM Peak		2025 PM Peak		
Segment	**1998**	**No-Build**	**Preferred**	**No-Build**	**Local Alternatives**	**Preferred**
NE 179th Street northbound off-ramp queue (ft.)	300’	300’	100’	***1250’***	350’	350’
Mainline queue prior to 179th Street off-ramp gore (ft.)	None	None	None	***1500’***	None	None
Mainline speed, I-205 to 179th	37 mph	22 mph	22 mph	16 mph	17 mph	33 mph
Mainline speed, north of 179th	52 mph	50 mph	50 mph	50 mph	46 mph	47 mph
PM Peak Hour Vehicles Using:	**1998**	**2005**		**2025**		
– NE 179th Street Interchange	1974	2403	1780	3470	3865	3025
– NE 219th Street Interchange	N/A	N/A	1189	N/A	N/A	1535
– Ridgefield Interchange	1000	1400	1000	2872	2866	2730
I-5/I-205 merge	D	F	F+	F	F	F+
Mainline, I-205/I-5 Merge to 179th	C	D	D	E	E	D
NB diverge at 179th off-ramp	C	C	C+	C	C	C+
NB merge at 179th on-ramp	B	C	C+	D	D	D+
Mainline, 179th to 219th	B	B	C	D	D	D
NB diverge at 219th*	N/A	N/A	C	N/A	N/A	D
NB merge at 219th*	N/A	N/A	C	N/A	N/A	D
Mainline, 219th to 269th	B	B	B	D	D	D
NB diverge at 269th	B	C	C	D	D	D
NB merge at 269th	B	B	B	D	D	D
NB Merge at 134th on-ramp*	B	B	C	E	E	F

* For no-build and local improvements alternatives, 219th interchange is not in the network.

\+ LOS is the result of applying the Highway Capacity Manual. As described in Chapter Six of this report, traffic simulation output is the preferred method to evaluate these alternatives. Traffic simulations indicate that the preferred operational alternative provides an improvement over no-build and local improvement alternatives in these sections.

Figure 8. Existing Weaving On I-5

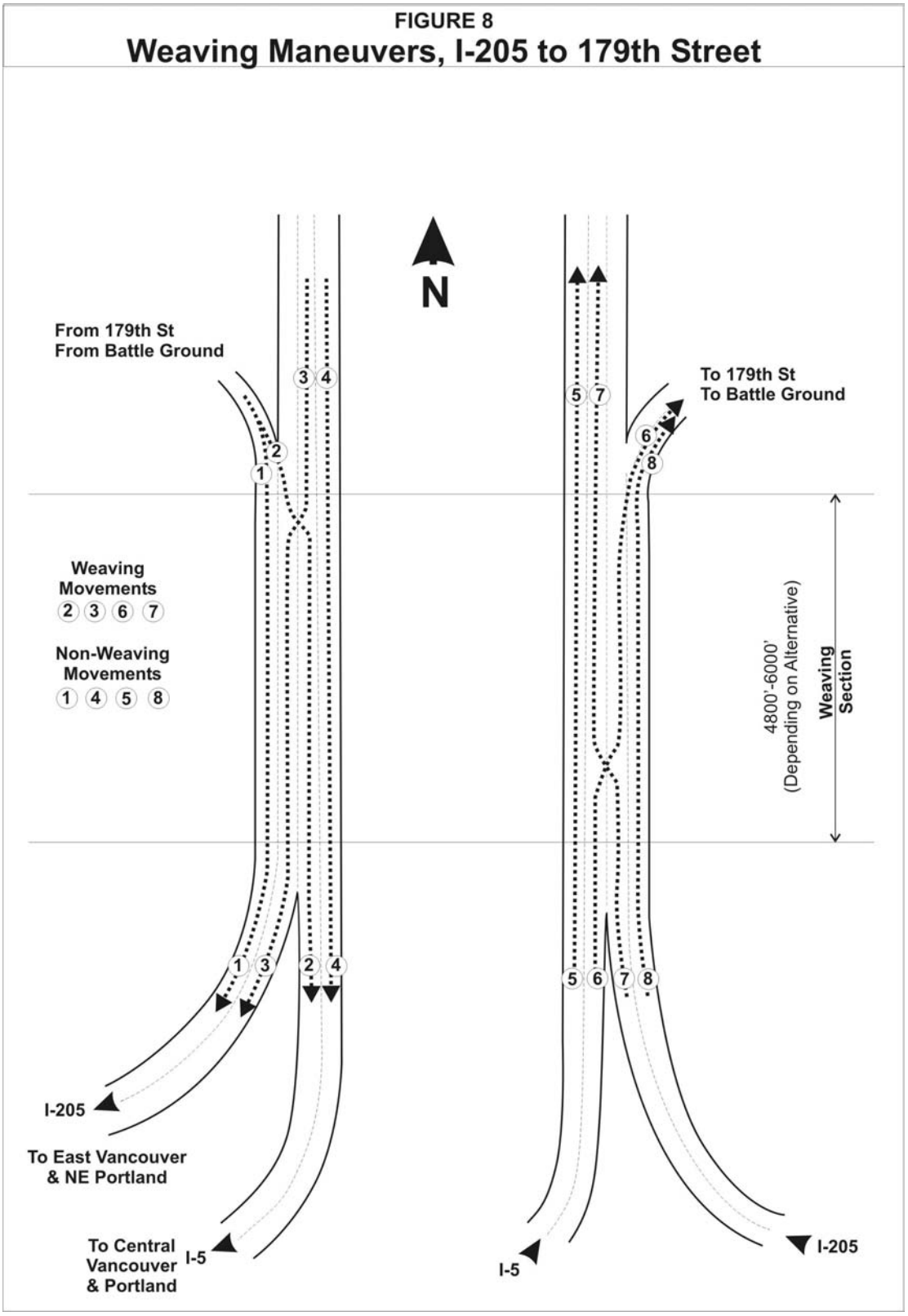

Figure 9. Existing and Projected – PM Peak Level of Service – No-Build

No Action Alternative

The no action alternative consists of the existing network and programmed projects in the study area. Included were a new north-south collector (Union Road/17th Avenue) between 134th and 179th Streets, and 179th Street widening from NW 11th Avenue to NE 19th Avenue. Also included was widening of I-5 to six lanes plus HOV lanes between NE 99th Street and NE 134th Street.

Minor Improvements to Existing Interchanges

These consist of widening existing ramps at the NE 179th Street and Ridgefield interchanges, making transit improvements (e.g., new Park-and-Rides, high level of bus service), and making TSM/Safety/ITS improvements (e.g., intersection improvements, traffic signal coordination, variable message signs) only.

With any of the "No New Interchange" alternatives, during the PM peak period northbound I-205 traffic would interact with traffic from I-5 exiting at NE 179th Street. In 2025, traffic density in the right two lanes will result in significant delays from I-205 to the NE 179th Street off-ramp. Traffic on I-205 continuing north on I-5 will likely weave across one or two lanes to the left two lanes of I-5, to avoid congestion in the right lanes. This alternative is projected to worsen the existing weaving problem, and may cause a higher number of accidents to occur. A similar situation exists for southbound traffic — traffic entering I-5 from NE 179th Street in the "No New Interchange" alternatives must weave across two lanes of I-5 to continue on I-5 south of the I-205 junction. Southbound traffic on I-5 exiting at NE 134th Street would need to merge to the right south of NE 179th Street, and mix with traffic entering from NE 179th Street.

Conclusions reached on the "Improving Existing Interchanges" alternative are:

- While they lessen current and future mobility and safety deficiencies at the NE 179th Street and Ridgefield interchanges along I-5, they do not improve mobility or safety deficiencies on SR 502 for regional trips to and from northeast Clark County.
- They do not reduce trips on I-5 or reduce traffic weaving in the critical section of I-5 between I-205 and NE 179th Street.
- They do little to improve transit and freight mobility in northeast Clark County.

Local Improvements (without new or modified access)

All local improvement alternatives include new crossings of I-5 at NE 139th Street, NE 154th Street, NE 209th Street, and NE 262nd Street; and widening of NE 72nd Avenue to 5 lanes and NW 11th Avenue to three lanes. Analysis includes tests of various east-west five-lane arterial improvement alternatives, including NE 179th Street, NE 199th Street, and NE 239th Street, and improvements to SR 502 between I-5 and Battle Ground and to other north-south roadways. For the purposes of this report, the most promising local improvement alternative for evaluation is widening SR 502 to five lanes from I-5 to Battle Ground, with modified limited access along the section between NE 179th Street and NE 219th Street as it is the most practical local improvement alternative to construct (does not require Comprehensive Plan amendments and is along an existing route planned for future improvements).

Widening SR 502 (NE 10th Avenue) between NE 179th and NE 219th Streets to five lanes and limiting access will require a significant amount of right-of-way and relocations for the widening and for purchasing access rights, which will generally impact the community. This is especially true south of NE 194th Street, where structures are close to the right-of-way, and little or no alternative access exists. The only options for managing access in this area would either be to

construct a median for the full length of NE 10th Avenue (with widening to allow for U-turns provided at four intersections), or to construct a frontage road couplet with local access off of the frontage road. This frontage road would connect to key intersecting roadways, to provide access to and from SR 502. However, because structures south of NE 194th Street are in close proximity of the right-of-way, they would likely need to be relocated or removed because they would intrude on the right-of-way needed for the frontage roads. Therefore, widening SR 502 would require a large right-of-way acquisition, construction cost would be high, and traffic operational improvements would be small.

Conclusions reached on the "Local Improvements" alternatives are:

- They exacerbate current and future deficiencies on I-5 at the NE 179th Street and Ridgefield interchanges by attracting more travelers to these interchanges (see Table 1).
- Although the SR 502 widening alternatives provide an improvement for regional trips using SR 502, they do not improve mobility or safety deficiencies on SR 502 between NE 179th Street and NE 219th Street as significantly as the preferred operational alternative.
- Projected LOS deficiencies and current and future high accident rates on SR 502 will not be reduced significantly by these alternatives, and will compromise the integrity of SR 502 as an NHS route between I-5 and Battle Ground by increased congestion and accidents in the future, and decrease its ability to serve regional trips along that corridor.
- Major improvements to SR 502 to provide additional capacity and reduce accidents by limiting access are difficult to achieve without significantly impacting the surrounding community. The cost of improvements to SR 502 between NE 179th Street and NE 219th Street (including interchange improvements at I-5) are higher than the cost of a new NE 219th Street interchange. The benefit/cost ratio for the new interchange is higher than for SR 502 improvements.
- Local improvements alternatives do not reduce traffic weaving in the critical section of I-5 between I-205 and NE 179th Street.

Major Improvements to the Existing NE 179th Street Interchange

Several alternatives were analyzed including reconstructing the interchange to a SPUI, and reconstructing to a SPUI plus flyovers from northbound I-5 to SR 502 and from SR 502 to southbound I-5. The alternatives analyzed in this strategy also included providing a new I-5 crossing at NE 209th Street, constructing or improving NE 209th Street from SR 502 (10th Avenue) to Delfel Road, improving Delfel Road from 209th Street to NE 179th Street,

reconstructing NE 179th to a SPUI, and constructing a northbound flyover off-ramp. These alternatives also included a widening of SR 502 to five lanes between I-5 and Battle Ground.

Conclusions reached on the "Improve NE 179th Street interchange" alternatives are:

- Although the SR 502 widening alternatives provide improvements for regional trips using SR 502, they do not improve mobility or safety deficiencies on SR 502 between NE 179th Street and NE 219th Street as significantly as the preferred operational alternative.
- These alternatives will not alleviate projected LOS deficiencies and current and future high accident rates on SR 502, compromising the integrity of SR 502 as an NHS route between I-5 and Battle Ground, and decrease its ability to serve regional trips along that corridor.
- The alternatives which include flyovers actually exacerbate traffic weaving in the critical section of I-5 between I-205 and NE 179th Street by reducing the length of the weaving section, especially with a southbound on-ramp flyover which reduces the weaving section southbound by 1,200 feet. This does not alleviate the current and future mobility and safety deficiencies in this section.
- Major improvements to SR 502 to provide additional capacity and reduce accidents by limiting access are difficult to achieve without significantly impacting the surrounding community.
- Reconstructing the NE 179th Street interchange to a SPUI shows benefits as long as it is accompanied by a NE 219th Street interchange.

Transit (TSM/TDM) Options

Two park-and-rides were assumed in this analysis, one at the NE 179th Street interchange, the other along NE 219th Street near NE 10th Avenue (Duluth). The analysis of the transit option, without any other improvements, showed that transit improvements only could not resolve the deficiencies identified in the problem statement. Transit and TSM/TDM options included in the preferred operational alternative include the two park-and-rides (the 219th Street park-and-ride being part of the preferred operational alternative), and future considerations for ramp metering at the 99th Street and 134th Street northbound on ramps.

SR 502

Many of the local improvement alternatives include SR 502 widening. There are several issues regarding SR 502 widening and access management. If the preferred operational alternative is not approved, there is still a need for significant improvements to the existing NE 179th Street interchange and on SR 502. This is a summary of the issues with that option. A more detailed discussion of SR 502 forecasts and congestion is contained in Appendices B and E.

SR 502 is included in the NHS. According to the legislation enacted in 1991 that established the NHS, "The purpose of the NHS is to provide an interconnected system of principal arterial routes which will serve major population centers, international border crossings, ports, airports, public transportation facilities, and other intermodal transportation facilities, and major travel destinations; meet national defense requirements; and serve interstate and interregional travel."

SR 502 serves trips from the Interstate Highway System (I-5) to Battle Ground (a population center with current and planned intermodal facilities, that serves interregional trips).

Protecting the integrity of the NHS is second in importance to protecting the integrity of the interstate system. Thus, maintaining or improving the mobility of regional commute trips and commerce between I-5 and Battle Ground relates to the strategies that can be put in place to preserve or improve mobility and safety along SR 502.

SR 502 is designated as a High Accident Corridor from I-5 to Battle Ground. WSDOT has planned projects to improve safety at specific intersections along SR 502, and has developed a long-term plan to manage access. The section of SR 502 (NE 10th Avenue) between NE 179th Street and NE 219th Street is currently a two-lane arterial roadway with frequent driveways and at-grade intersections. Although these WSDOT safety projects should alleviate the accident problem, the presence of frequent access points is likely to continue to result in high accident rates along the corridor.

Another mobility strategy in WSDOT's System Plan for SR 502 is to widen the entire corridor to four lanes from I-5 to Battle Ground. This should alleviate the 2025 forecast of peak period volume-to-capacity ratios of 1.1 to 1.2 along the corridor (LOS E and F, which is deficient by WSDOT's standards).

Widening 10th Avenue (SR 502) between NE 179th and NE 219th Streets to four travel lanes may have significant impacts (see above). The cost of widening this SR 502 section and providing access management is over $13 million. Coupled with the cost of providing a high level of design at the NE 179th Street interchange to serve these trips (such as the flyovers, and the realignment of SR 502 at NE 179th Street), the total cost of widening SR 502 from I-5/NE 179th Street to NE 219th Street is over $33 million.

Clark County has designated the area surrounding SR 502 south of NE 199th Street as urban reserve. When brought into the urban area, this land will likely be zoned industrial, office, or commercial. Access management may become more problematic as requests for full access to and from SR 502 during the site development process, coupled with the lack of alternative access, may result in a significant number of new driveways onto SR 502 which in turn affects traffic operations and accidents.

NE 219th Street Interchange (Preferred Operational Alternative)

This would be a new diamond interchange on I-5 between approximately NE 209th Street and 219th Street, with frontage road access to the west of I-5 and a four-lane SR 502 extension to the east that connects to the existing SR 502 at NE 10th Avenue. The NHS route would be redesignated to include this new SR 502 extension which would consist of a four-lane, limited access arterial between the NE 10th Avenue/219th Street intersection and I-5, and would no longer include NE 10th Avenue between NE 179th Street and NE 219th Street. Also included would be a 179th SPUI, access management along SR 502 from I-5 to Battle Ground, and a new park-and-ride along 219th Street east of I-5.

Local improvements necessary to support the preferred operational alternative, to be in place by the year 2025, including widening of NE 179th Street between NW 11th and NE 29th Avenues,

and widening of SR 502 from NE 10th Avenue to Battle Ground. All other local arterials are projected to operate at LOS D or better.

Please refer to **Figures 4 through 7** at the end of the Executive Summary for illustrations of the preferred alternative.

Conclusions reached on the "219th Interchange" alternative are:

- It provides improvements for regional trips using SR 502.
- The NE 219th Street interchange is the only alternative that provides some alleviation of the short- and long-term congestion and accident problems on the I-5 section between NE 179th Street and I-205.
- While speeds north of NE179th Street are slightly lower with this alternative, it does not lower the level-of-service (LOS E) compared to the other alternatives.
- The cost of the new interchange and SR 502 extension is less than the cost of improvements to SR 502 between NE 179th Street and NE 219th Street (including interchange improvements at I-5), and has a higher benefit/cost ratio than that alternative.
- The NE 219th Street interchange is projected to shift some of the weaving traffic to the I-5 section north of NE 179th Street (see Chapter 6). This would reduce the amount of weaving and improve traffic operations and safety in the section between NE 179th Street and I-205.
- It will reduce traffic at the NE 179th Street and Ridgefield interchanges (Table 1), thus improving the level of service.
- All improvements contained in the preferred operational alternative are necessary for the interstate and arterial system to properly function.The preferred operational alternative will not adversely impact I-5 and its interchanges with the NE 134th Street interchange preferred operational alternative in place.

Table 2 summarizes the evaluation of the reasonable alternatives.

Table 2. Evaluation Summary

MEASURE	NO-BUILD	LOCAL IMPROVEMENTS (SR 502)	IMPROVE EXISTING INTERCHANGES	PREFERRED OPERATIONAL ALTERNATIVE*
Interstate Impacts				
- South of I-205	○	◑	◑	◑
- I-205 to NE 179th	○	○	○	●
- North of NE 179th	○	◑	◑	◑
Regional Mobility to/from Northeast Clark County	○	◑	◑	●
Accidents on SR 502	○	◑	○	●
Accidents on I-5	○	◑	◑	◑
Freight Mobility to/from Northeast Clark County	○	●	◑	●
Transit Mobility	○	◑	◑	●
Impacts to Adjacent Interchanges				
- NE 179th Street	○	◑	●	●
- Ridgefield	○	◑	●	●
Benefit/Cost	**N/A**	◑	◑	●
NHS Route Integrity	○	●	◑	●
Wetlands Impacts	***N/A***	○	◑	◑
Community Benefits	○	◑	◑	●

*New NE 219th Street/SR 502 interchange and reconstruct NE 179th Street interchange to a SPUI.

○ Negative impact or disbenefit

◑ Minor benefit

● Significant positive impact or benefit

Policy Point Three Conclusions: Reasonable Alternatives

The advantages of the 219th Street interchange alternative (as opposed to widening SR 502 to five lanes between NE 179th and NE 219th Street) are:

- Although accidents may increase slightly on I-5 north of NE 179th Street under the NE 219th Street interchange alternative due to increased traffic on that facility, accidents should decrease on I-5 south of NE 179th Street and on SR 502 (NE 10th Avenue) due to the traffic decreases on that facility.
- The cost of improving SR 502 between NE 179th Street and NE 219th Street (including interchange improvements at I-5) are higher than the cost of a new 219th Street interchange. The benefit/cost ratio for the new interchange is higher than for SR 502 improvements between 179th and 219th under the local improvement alternatives.
- The SR 502 extension from I-5 to Duluth (10th Avenue) will be fully access controlled. The cost to fully control access along NE 10th Avenue/SR 502 between NE 179th Street and NE 219th Street is prohibitive, and such a project is problematic and long-term at best. Additionally, current zoning (which includes

urban reserve lands along NE 10th Avenue north to 199th Street) allows for future development along this corridor, with additional access points likely. Thus, the ability to protect the integrity of this NHS route between I-5 and Duluth is better achieved with the NE 219th Street interchange than by widening the current route on NE 10th Avenue.

- The NE 219th Street interchange alternative is less expensive.

All of the reasonable improvement non-modified access alternatives were eliminated because they:

- The only alternatives that fully address the project's purpose and need and respond to the problem statement are the proposed NE 219th Street interchange, and modernizing the NE 179th Street interchange by reconstructing it to a single-point urban interchange. SR 502 will be realigned to 219th Street. This is recommended as the preferred operational alternative
- Do not improve mobility or safety deficiencies on SR 502 for regional trips to and from northeast Clark County as well as access modification alternatives;
- Do not reduce the amount of lane-changing occurring on I-5 between I-205 and NE 179th Street and thus do not alleviate future congestion and safety deficiencies on that section of Interstate; and
- Do not provide significant improvements to transit and freight mobility in northeast Clark County.

The preferred operational alternative is the only alternative which satisfies the project purpose and need.

POLICY POINT FOUR: NEED FOR THE ACCESS POINT REVISION

DM1425 Policy: What are the current and projected needs and why won't the existing access points and existing and/or improved local system meet the needs? Is the anticipated demand short or long trip?

This policy point examines the purpose and need of the proposed access point revision. Guidance require demonstration that the existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal. Additionally, it must also be demonstrated that the demand being met with the proposed access modification is for primarily regional (long) trips.

This analysis concluded that implementing the preferred operational alternative is needed to adequately maintain Interstate mainline operations and safety as well as arterial mobility for regional trips to and from northeast Clark County using I-5 and SR 502.

The *I-5/I-205 North Corridor Study* as well as local and regional planning studies have all indicated that the existing interchanges, the SR 502 corridor between I-5 and northeast Clark County, and the I-5 mainline in the NE 179th Street interchange vicinity will become deficient by the Year 2025, and likely will become deficient within the next ten years. The report also indicated there would likely be future deficient level of service on I-5 and on I-205 south of the 179th Street interchange.

The primary purpose of this new and modified access proposal is to improve safety and regional mobility for the northeast Clark County travel shed by improving SR 502 as the primary arterial and as an NHS route. Specifically, the intent is to alleviate current and future safety and mobility deficiencies on SR 502. This can be accomplished by providing a new interchange on I-5 between the NE 179th Street and Ridgefield interchanges and improving the NE 179th Street interchange. Chapter Three of this report details the alternatives analysis which identified the need for the preferred operational alternative.

This project's objectives are to:

- Maintain or improve the integrity of traffic operations on the I-5 mainline and at existing interchanges on I-5; and
- Improve regional mobility between northeast Clark County and the rest of the region.

Existing deficiencies described in this corridor (see Policy Points Three and Six of this report) are traffic congestion and a high accident rate. These deficiencies are created in part by ramp spillover onto the I-5 mainline from the NE 179th Street interchange, and by a large traffic volume weaving in the segment between the NE 179th Street interchange and I-205, north and south. Alleviating these existing deficiencies will reduce current and future travel time delays for regional trips to and from northeast Clark County using I-5. Additionally, a new interchange would alleviate accident recurrence and risk on the section of SR 502 adjacent to I-5 between NE

179th and NE 219th Streets. Although accidents may increase slightly on I-5 due to increased traffic volumes with the new interchange, the number and severity of accidents in the overall study corridor should be reduced by shifting traffic onto a facility with a much-lower accident rate (see Table 3 on Page 63).

The alternatives analysis concluded that none of the local system or existing interchange modification alternatives will resolve the deficiencies outlined in the project's purpose and need. Therefore, to alleviate the interchange deficiencies and to protect the integrity of traffic operations in the interchange vicinity, an interchange improvement which includes both new and modified Interstate access is being recommended as the preferred operational alternative. This would be accomplished by providing a new access point at approximately NE 219th Street (otherwise known as the SR 502 extension), and modernizing the NE 179th Street interchange by reconstructing it to a single-point urban interchange.

Analysis

Figures 2 and 3 (pp.13, 15) earlier in this report showed the trip make-up of the I-5 and I-205 ramps in the Year 2025. The analysis, based on demand modeling using regional land use forecasts, and contained in Chapters Three and Six of this report demonstrated that the NE 179th Street and NE 219th Street interchanges serve primarily regional trips. This indicates that local system improvements alone will not benefit these trips.

Each alternative which maintains the existing interchange configurations at Ridgefield and at NE 179th Street are anticipated to experience queuing onto the I-5 mainline and will prevent the ramp queues from clearing. This will likely combine with future deficiencies on the section of I-5 between I-205 and NE 179th Street due to traffic lane-changing maneuvers occurring in this section of interstate. Additionally, with stopped traffic occurring on the mainline in and next to normally moving traffic lanes, rear-end and lane-changing accidents will continue to increase even with the 134th preferred operational alternative, exacerbating the current high-accident situation on I-5.

The section of I-5 between I-205 and NE 179th Street is critical; it is part of the High Accident Corridor designated in the 1999-2018 Highway System Plan. Accidents and congestion are attributable to a high number of lane-changing maneuvers in this section of Interstate (6,000 feet). Vehicles entering southbound I-5 from NE 179th Street must weave across at least two lanes to avoid I-205 and continue south on I-5. Vehicles desiring to exit southbound I-5 at NE 134th Street must move to the right lane of the freeway because access to 134th Street is off I-205 immediately south of the I-5/I-205 diverge. This movement mixes with the traffic entering from NE 179th Street, resulting in the high amount of lane changing.

A similar situation occurs northbound, as traffic entering the freeway from NE 134th Street must merge with I-205 and then weave across at least one lane of I-205 to continue northbound on I-5 north of 179th Street. This traffic mixes with traffic exiting at NE 179th Street.

Based on the 2005 and 2025 travel forecasts, future increases in traffic volume are expected to cause this I-5 section to become deficient (falling below congestion standards) within eight to ten years. The corridor is forecast to be operating at LOS E conditions, and as 179th Street ramp

traffic and I-5 traffic continue to grow, the number of accidents related to lane-change maneuvers in this critical I-205-to-NE 179th Street section will increase.

SR 502 between I-5 and Battle Ground is projected to fall to LOS E/F by 2025 without improvements. Even with access management improvements along the corridor, existing driveways and at-grade intersections are expected to result in continuing or exacerbating the high accident condition along this corridor especially the section between 219th Street and 179th Street (which is bypassed in the preferred alternative).

A new NE 219th Street interchange along with realignment of SR 502 was proposed to alleviate the accident and congestion issues on SR 502 serving regional trips to and from northeast Clark County and in the section of I-5 between I-205 and NE 179th Street. By providing a new interstate access north of NE 179th Street which would serve regional trips to and from northeast Clark County, traffic volumes on a section of the deficient SR 502 between 179th Street and NE 219th Street would be significantly reduced, and the amount of lane-changing in the I-5 section between I-205 and NE 179th Street should also be reduced, alleviating the congestion and accident problem in the study area.

Appendix C contains the travel forecasting technical memorandum.

Policy Point Four Conclusions: Need

Improving the existing interchange and providing local system improvements alone cannot resolve the operations, mobility, and safety issues identified in the problem statement. The Interstate access modifications (new and modified access) contained in the preferred operational alternative, combined with local system improvements, are needed to adequately maintain Interstate mainline operations and safety as well as arterial mobility for regional trips to and from northeast Clark County using I-5 and SR 502.

POLICY POINT FIVE: ACCESS CONNECTIONS AND DESIGN

Background

DM1425 Policy: Will the proposal provide fully directional interchanges connected to public roads, spaces appropriately, and designed to full design level geometric control criteria?

Guidance for Policy Point Five of the Access Decision Report is to show that the proposal will provide fully directional interchanges connected to public roads, spaced appropriately, and designed to full design level geometric control criteria which meet or exceed full Interstate standards. The intent is to provide for fully-directional interchanges which connect with public roads, with certain exceptions being considered, such as for HOV ramps. The information must be presented in sufficient detail to show that the proposed access can be constructed to full interstate standards.

This chapter discusses the proposed modifications to and addition of accesses presented in the build options. The build options include modifications to the existing 179th Street interchange and some include construction of a new interchange in the vicinity of 219th Street. Interchange spacing, ramp configuration, weave distances, and traffic projections are identified in sufficient detail to allow an operational review of each of the build options necessary to maintain an acceptable LOS over the 20-year design period.

The design analysis concluded that the proposed access can be constructed to full Interstate standards as described in the WSDOT Highway Design Manual and the AASHTO Policy on Geometric Design of Highways and Streets.

Alternatives

During the "I-5/I-205 North Corridor Study" the study team developed and presented a number of design options for improvements to the 179th Street interchange and for a new interchange near 219th Street. Of those, seven operational alternatives were selected for further analysis and comparison to the "no-build" condition as part of the Access Decision Report process. **Appendix D** of this report contains a detailed technical memorandum of the design process and findings for the various alternatives. The section below describes the design process for the preferred operational alternative. **Figures 4 through 7** in the Executive Summary depict conceptual designs of the preferred operational alternative.

The following alternatives were explored:

- No-Build. Includes Clark County's programmed project to construct NE 17th Avenue/Union Road from the Whipple Creek area north to NE 179th Street. No other improvements are included in the interchange area.
- This includes new overpasses of I-5 at 139th Street, 154th Street, and 262nd Street as well as a consideration for a new crossing at NE 209th Street; and widening alternatives of SR 502, NE 179th Street, NE 199th Street, and NE 239th Street.

- Major improvements to the 179th Street interchange: these include reconfiguration to a SPUI as well as a SPUI with flyover connections to directly connect I-5 with SR 502.
- Preferred Operational Alternative: this includes construction of a new interchange at approximately NE 219th Street (one design option that is being considered would place the interchange at approximately NE 209th Street) and reconfiguration of the NE 179th Street interchange to a SPUI.

Design Standards

Conceptual design was completed using the WSDOT Highway Design Manual. This manual comprehensively discusses highway design elements including design speed, highway and ramp cross-section, acceleration and deceleration distances for both on-ramps and off-ramps, interchange spacing, and roadway alignment. The preliminary designs were completed using the "Full Design Level" standards found in Chapter 4 of the design manual.

Design Conditions of the Features

Each design option was made up of several features. The critical design elements contained in each of the features are discussed with their respective compliance to the standards provided above. The following summarizes the design elements of the preferred operational alternative.

All elements presented are in compliance with the above design standards. No exceptions are required.

Local Improvements

A number of local improvements were investigated during the design process. Detailed descriptions of the local improvements are contained in **Appendix D**.

Interchange Improvements

The following are interchange improvement components of the preferred operational alternative:

Reconfigure 179th Street interchange as a Single Point Urban Interchange(SPUI)

One option for reconfiguring the 179th Street interchange is as a SPUI. The SPUI style of interchange improves traffic flow, particularly when the demand to turn left or right from the ramps is fairly balanced, since it creates only one signalized intersection at the ramp terminals. The WSDOT has used SPUI interchanges successfully in Clark County in a number of locations, including at 78th Street and 99th Street on I-5 a few miles south of this location.

The existing freeway overcrossing would be reconstructed to allow for the realignment of NE 179th Street as discussed in Appendix D (p.D-4). No additional widening of the freeway from its existing 6-lane configuration is expected at the location of the 179th Street overcrossing. However, auxiliary lanes between I-205 and the 179th Street ramps in both north and south directions would be added, and if an interchange near 219th Street is constructed, auxiliary lanes between 179th Street ramps and the new interchange would also be included.

Construct new interchange at 219th Street

A proposed operational alternative includes improvements to the 179th Street interchange with a new interchange constructed in the vicinity of 219th Street. Three of the options have a diamond interchange at 219th Street, the fourth option has an interchange at approximately 209th Street as described above.

For the three interchange options at 219th Street, the only difference is in the configuration of the northbound off-ramp to 219th Street. In all the options, this ramp splits from the existing ramp to the Gee Creek Rest Area. Design options differ as to how to connect to NE 219th Street and the interaction with the on-ramp to I-5 from the rest area.

Common to all the options is a new four lane SR 502 between the interchange and the intersection of 219th Street with 10th Avenue. A lane addition is proposed at the northbound on-ramp, leaving a four-lane section west of that ramp. A new overpass structure, approximately 550' long would be constructed to cross over the Gee Creek on-ramp, both directions of I-5, and wetlands present in the I-5 median. Other common design features are single lane ramps in all directions, and a frontage road on the west side of the freeway that connects 219th Street to 209th Street. The west end of 219th Street is terminated in a way that would allow for future extension of 219th Street to Hillhurst Road, but such an extension is not proposed by this project.

Access Control

WSDOT requires access control within 300' of a ramp terminus, or if a side street intersects within 350' of the ramp intersection, 130' additional control along each leg of the side street intersection.

The current interchange designs provide for full access control requirements. None of the proposed interchange improvements would require a loss in access to any nearby property or a deviation from full access control, but some local improvement option elements would require property acquisition as a result of the establishment of an access management plan along SR 502 east to the Battle Ground city limits. WSDOT has committed to establishing access control along 219th Street/SR 502. Where possible full or partial control will be acquired; however, due to existing property build out, the use of modified control may be necessary in some areas.

Ramp Spacing and Weaving Summary

The proposed interchange configurations meet WSDOT interchange spacing minimums when measured between gore points.

Policy Point Five Conclusions: Design

The requirements for Policy Point 5 of the Access Decision Report are to show that the proposed new or revised access can be designed to meet or exceed current standards for the Interstate System. The information is presented in sufficient detail in the appendix to show that the proposed operational alternative can be constructed to full Interstate standards. All elements presented are in compliance with the above design standards. No exceptions are required.

POLICY POINT SIX: OPERATIONAL AND ACCIDENT ANALYSES

DM1425 Policy: How will the proposal affect safety and traffic operations now and for the next twenty years?

Guidance requires a safety and operational analysis of the proposal, as well as analyzing alternatives to access modification using the same analysis. This analysis includes a short-term (opening year, in this case 2005) and long-term (20-year, in this case 2025) analysis. The analysis must demonstrate that the proposed access has no "significant adverse impact" to the Interstate mainline's safety or operations. The Steering Committee is charged with defining "significant adverse impact".

This analysis concluded that the preferred operational alternative is the only alternative which improves overall safety and traffic operations in the study area, while not negatively impacting Interstate safety or traffic operations.

The analytical models, calibrated to existing conditions, used Year 2005 and 2025 travel demand volumes generated by the Regional Transportation Council's regional travel model to analyze alternatives. Measures of effectiveness included travel time, delay, speed, vehicle density, and LOS.

Accident analysis included examination of the existing High Accident Corridors on I-5 and on SR 502, and predominant accident types and causes. Primary causes of accidents on SR 502 are angle and head-on collisions, due to numerous driveways and at-grade, unsignalized intersections coupled with no physical separation of opposing traffic lanes. On I-5 between I-205 and NE 179th Street accidents are primarily due to vehicles changing multiple lanes in a relatively short distance.

In keeping with the Purpose & Needs, alternatives were evaluated with respect to their ability to alleviate weaving on I-5 or reduce volumes (and thus traffic conflicts) on SR 502, which in turn should reduce the number of accidents in these corridors. This can be achieved by extending the traffic weave north of 179th Street for regional trips to and from northwest Clark County which would exit at 219th Street in the preferred operational alternative.

Appendix E contains the traffic operational and safety analysis technical memorandum. Table C-4 in Appendix C also summarized the alternatives analysis. Additional discussion of the traffic operational analysis issues is contained in Appendix G.

Analysis Methodology

Traditionally, traffic operations are measured by calculating LOS based on Highway Capacity Manual (HCM) techniques. The HCM process uses volumes and lane information to develop a capacity, a volume-to-capacity ratio, speed (for mainline sections) or delay (for intersections), which results in a LOS. For the purposes of this report, Synchro/SimTraffic and CORSIM were used to analyze and evaluate the alternatives.

There are several shortfalls to using HCM techniques that impact the analysis presented here. First, the HCM measures the number of vehicles past a certain point over a specific period of time. However, it does not account well for spatial representation of the traffic situation. For example, at an intersection, the HCM LOS is based on the number of vehicles successfully passing through the intersection during an hour. It does not, however, account for vehicles which arrived at the intersection but could not be served, as they are in a queue. Thus, while the HCM may be calculating a satisfactory LOS, such as LOS C, an intersection may actually have extensive queues which result in much higher delays than what HCM is estimating.

Another shortfall of the HCM algorithm is that it does not account for instances where mainline traffic may be queued or bottlenecked upstream (LOS E/F conditions), but at the point being measured the resultant HCM LOS is acceptable (LOS D). Since many bottlenecks tend to occur prior to or after merge/diverge points (as opposed to at the merge/diverge point), the mainline LOS (or merge/diverge LOS) may be acceptable using HCM calculations, but in actuality traffic is being queued with significant speed reductions and delays.

Finally, the HCM defines a "weaving section" as a section of freeway of 2,500 feet or less where traffic is changing lanes to enter/exit a freeway, or between ramps. In this case, however, the 6,000-foot section of I-5 between I-205 and NE 179th Street has an extremely high occurrence of traffic changing lanes, or "weaving", as traffic northbound on I-205 must weave to the left to continue north on I-5, and traffic northbound on I-5 must weave to the right to exit at NE 179th Street. The southbound situation is similar. This weaving has resulted in this section of I-5 being designated a High Accident Corridor in the WSDOT 1999-2018 HSP. The high occurrence of weaving also will contribute to a reduction in speed and level-of-service along this section of I-5. However, the HCM algorithm cannot be applied in this case, as it fails to consider a section longer than 2,500 feet as a weaving section, even if, as in this case, there is a high amount of weaving (over 50 percent of the traffic in this section, in both directions, is involved in lane-change maneuvers).

To resolve this, traffic simulations consisting of CORSIM and Synchro/SimTraffic were used. Traffic simulations give a spatial representation to traffic, and graphically animate that traffic flow. Bottleneck locations are easy to observe, and models can be calibrated to existing conditions and validated by comparing field observations of traffic flow to the simulation model. These models also enable a comparison of alternatives by measuring speed at various points along a freeway corridor, which allows LOS to be measured at different locations, rather than the HCM's more generalized analysis. The ability to include the impacts of vehicle queuing and slowing on other vehicles gives a better ability to measure speed along a section of interstate mainline, and also observe queues and slowing where weaving is actually occurring in the model. Finally, the simulation models give an ability to measure and observe the impacts of long weaving sections (greater than 2,500 feet), such as in this case.

The methodology used in the analysis and reported herein uses the resultant CORSIM and Synchro/SimTraffic output speeds and traffic observations. HCM lookup tables are applied to the resultant speeds which result in a level-of-service. The resultant LOS is reported here, along with the estimated queues and speeds from the simulation modeling.

Defining No Significant Adverse Impact

The safety and operational analysis must demonstrate that the preferred operational alternative does not create significant adverse impacts to the safety and operational aspects of the Interstate. For traffic operations, this is defined as:

- Ensuring current and future ramp queues will not extend onto the Interstate mainline
- Level-of-service as calculated by HCM techniques cannot degrade compared to the No-Build or local improvement alternatives (i.e. if the No-Build LOS is E, the "build" cannot be lower than E)
- Other operational aspects, such as speed, weaving, or delay, cannot be degraded compared to the no-build or local improvement alternatives scenarios.

For safety, no significant adverse impact is defined as:

- The preferred operational alternative cannot significantly increase the number or severity of accidents in the interchange influence area.

As additional access points may increase the number of accidents on the interstate, the increase must be offset by an equal or greater decrease in number and severity of accidents on the surrounding principal arterial system with the preferred operational alternative, provided that the need for the access modification has been established.

Simulation Results

Snapshots of the existing (1998), 2005, and 2025 traffic simulations for the I-5 corridor are presented in **Figures 10 through 16** at the end of this chapter. The snapshots are taken at approximately 5 PM, which is midpoint of the current and future PM peak hour. Existing volumes are based on 1998-1999 counts and the resultant simulation matches what has been observed in the field (LOS C conditions). Year 2005 and 2025 volumes are based on regional EMME/2 model demand volumes and input into the simulation model.

In **Figure 10** (existing PM peak hour), there is very little congestion in the corridor, especially between I-205 and NE 179th Street. This congestion increases for the 2005 No-Build (**Figure 11**), especially at the I-5/I-205 junction and near NE 179th Street. This congestion is reduced with the preferred operational alternative in 2005 (**Figure 12**) as the amount of weaving is reduced in the I-205 to NE 179th Street section.

Significant congestion occurs in all alternatives in 2025. However, the No-Build alternative (**Figure 13**) shows near-gridlock conditions occurring between I-205 and NE 179th Street. The queue spillback from NE 179th Street onto the I-5 mainline results in queuing not only at the ramp gore, but also at points preceding the ramp gore as vehicles in the simulation which are exiting at NE 179th Street are attempting to merge into already-slowed or stopped traffic. This affects the adjacent (through) lanes on I-5.

In the Local Improvements alternative (**Figure 14**), there are some improvements but significant congestion still is present in the right two lanes of I-5, and the I-5/I-205 junction continues to

show merge problems. There is no improvement to this in the NE 179th Street flyover alternative (**Figure 15**).

Only in the preferred operational alternative (**Figure 16**) is there an adequate improvement in traffic operations along the I-5 mainline. Even though densities are still high, traffic destined for northeast Clark County which in the non-modified access alternatives exited at NE 179th Street, now exits at the new NE 219th Street interchange, reducing the amount of weaving occurring in the critical I-5 section. The amount of weaving reduction is on the order of 2 percent of the total traffic (approximately 70 to 140 vehicles in the year 2025 PM peak) using this section of I-5; due to the extremely dense traffic situation a 2 percent reduction in weaving results in a noticeable improvement in the traffic flow situation on this section of I-5.

Table 4 below summarizes the Year 2025 simulation results for various sections of I-5 and the existing interchanges. It also includes other performance measures. In almost all instances, the preferred operational alternative outperforms all other alternatives. For mobility for regional trips to and from northeast Clark County, the preferred operational alternative reduces per-trip travel

by seven minutes from NE 99th Street to Battle Ground (compared to the No-Build alternative) during the PM peak period.

Benefits and Costs

The preferred operational and other alternatives were evaluated with respect to costs and benefits. Costs include construction, right-of-way acquisition, and environmental impact mitigation. Benefits are measured by reduction in accidents along I-5 as well as mobility improvements, all measured over a twenty-year period. A benefit-to-cost ratio is calculated which compares the calculated benefits to the cost estimate. If the ratio is over 1.0, the benefits exceed the costs.

The total cost of the preferred operational alternative is approximately $55 million. The cost of reconstructing the NE 179th Street interchange to a single-point urban interchange, along with the realignment of NE 10th Avenue north of 179th Street, is approximately $30-33 million, and the cost of a new 219th Street interchange is approximately $23-25 million.

Compared to its cost, the preferred operational alternative has a benefit-to-cost ratio of approximately 3.55, which means that its benefits (in reduced accidents and user delay over twenty years) are 3.55 times its cost. This is significantly higher than the reasonable local improvement alternatives (no 219th Street interchange), which have a benefit-to-cost ratio of 1.25.

Table 3 summarizes the benefit-to-cost calculations. **Table 4** summarizes the operational analysis results.

Table 3. Benefit/Cost Calculations – 179th Street and 219th Street Interchanges

	No-Build	Local Improvement Alternative[1]	Preferred Operational Alternative
20-Year Study Area PDO Accidents	736	770	750
20-Year Study Area Injury/Fatal Accidents	580	600	566
Change from No-Build: PDO Accidents		34	14
Change from No-Build: Injury/Fatal Accidents		20	-14
PDO Benefit ($6,000 per reduced accident)		($204,000)	($84,000)
Inj/Fatal Benefit ($85,000 per reduced accident)[2]		($1,700,000)	$1,190,000
Total Safety Benefit (20-Years)		*($1,904,000)*	*$1,106,000*
Weekday Study Area Year 2025 VMT[3]	2,481,560	2,519,380	2,481,280
Weekday Study Area Year 2025 VHT	68,954	65,779	63,841
Change in VMT from No-Build		37,820	(280)
Change in VHT from No-Build		(3,175)	(5,113)
Mobility Benefit (20-Years)		*$86,307,155*	*$194,101,054*
Total Benefit		**$84,403,155**	**$195,207,054**

[1] Includes single point urban interchange at NE 179th Street, flyovers directly connecting between SR 502 and I-5, and widening and access management on NE 10th Avenue/SR 502 between NE 179th Street and NE 219th Street. Includes $8 million for the widening of NE 10th Avenue between 179th and 219th Streets that is not included in the Preferred Operational Alternative.

[2] Approximate weighted average of fatal, evident injury, and possible injury.

[3] Assumes an 800-space Park-and-Ride is built adjacent to the interchange

Total Cost[4]		**$68,000,000**	**$55,000,000**
Benefit/Cost Ratio		***1.24***	***3.55***

[4] Includes an additional $5 million for a new Park-and-Ride at 179th Street (Local Alternative) or 219th Street (Preferred Operational Alternative).

Table 4. Evaluation Results – Year 2025 Analysis

Criterion	Baseline (No-Build)	Local Improvement Alternatives	Improve Existing Interchanges	Preferred Alternative (219th Street Interchange with 179th SPUI)
I-5 PM peak speed (mph), north of 179th Street	50	46	46	47
I-5 PM Peak Speed (mph) I-205 to 179th Street	16	17	17	33
I-5 AM Peak speed (mph), 179th Street to I-205	19	41	41	44
I-5 AM peak speed (mph), north of 179th Street	44	47	47	46
I-5/179th NB off-ramp 95% Queue Length exceeds ramp length (PM Peak)?	Yes	No	No	No
I-5/Ridgefield NB off-ramp 95% queue length exceeds ramp length (PM Peak)?	Possible	No	No	No
Weaving traffic, I-5 between I-205 and NE 179th Street (percent of total pm peak traffic)	51%	51%	52%	50%
Total peak hour traffic	7078	7080	7080	7084
Weaving traffic	3610	3641	3652	3509
Trip types served by improvements	N/A	Local/ Regional	Regional with some local	Primarily regional
I-5 Travel time, NE 99th Street to Battle Ground (center of northeast Clark County travel shed) (minutes per trip)	29	27	26	22

Figure 17 shows the Year 2025 queuing and level-of-service for the No-Build alternative, while **Figure 18** show the Year 2025 queuing and LOS for the Local Improvements Alternative, which has queuing approximately the same as the Improve Existing Interchanges alternative. **Figure 19** shows the Year 2025 queuing and LOS for the NE 179th Street flyover alternative. **Figure 20** shows Year 2025 queuing and LOS for the preferred operational alternative.

The simulations resulted in the following conclusions about traffic operations:

- The preferred operational alternative lessens the weaving problem, and has higher mainline speeds than the other alternatives.
- The preferred operational alternative provides the greatest mobility benefits to regional commute, transit, and freight trips on the SR 502 corridor between I-5 and northeast Clark County.
- The preferred operational alternative does not degrade the LOS on I-5.

Accident Analysis for the Preferred Operational Alternative

Accident analysis included examination of the existing High Accident Corridors on I-5 and SR 502, and predominant accident types and causes. The primary cause of accidents in the section of I-5 between I-205 and NE 179th Street is vehicles changing lanes between the two interchanges. The primary cause of accidents on SR 502 is frequent at-grade driveway accesses and intersections along the corridor.

Alternatives were evaluated with respect to their ability to alleviate weaving on I-5 or reduce volumes (and thus traffic conflicts) on SR 502, which in turn should reduce the number of accidents in these corridors.

There is no standard accident predictive model available to project changes in number of accidents between alternatives. Therefore, an accident predictive model was developed for this analysis. It consists of using I-5 and SR 502 current accident rates (1994-1996, latest three-year period available), and supplying a projected accident rate for the SR 502 limited access extension to I-5 using 1994-96 accident rates for a similar limited access section of SR 503 south of Battle Ground. Accident rates in the I-5 weaving section were estimated using the existing accident rate and adjusting the number of accidents upward or downward based on the amount of weaving in that section by alternative.

To account for the new access points at NE 219th Street, accidents on I-5 between 179th Street and 219th Street were estimated by using the existing accident rate for I-5 in the vicinity of the 179th Street interchange and the existing rest area interchange. This accident rate is higher (0.6 accident per million vehicle miles traveled) than the section of I-5 between the two interchanges (0.2 accident per million vehicle miles) as there are no access points in this section. Accidents were projected over a 20-year period.

The resultant accident projections are shown in **Table 5** below. While there is expected to be a slight increase in accidents on I-5 due to increased traffic north of 179th Street, the preferred operational alternative has the lowest number of total and injury/fatal accidents of any of the alternatives.

Table 5. Accident Results – Twenty Year Analysis

Section	Baseline (No-Build)	Local Improvement Alternatives	Improve Existing Interchanges	Preferred Alternative (219th Street Interchange and 179th SPUI)
ALL ACCIDENTS				
I-5, I-205 to 179th Street	397	407	422	**402**
I-5, 179th Street to 219th Street	534	532	536	**548**
SR 502, 179th Street to 219th Street	385	396	428	**260**
SR 502 extension, I-5 to NE 10th Avenue*	N/A	N/A	N/A	**73**
TOTAL I-5 Accidents	*931*	*939*	*958*	***950***
TOTAL STUDY AREA ACCIDENTS (I-5, SR 502)	*1316*	*1335*	*1386*	***1282***
INJURY ACCIDENTS				
I-5, I-205 to 179th Street	136	137	142	**140**
I-5, 179th Street to 219th Street	263	262	264	**270**
SR 502, 179th Street to 219th Street	181	186	201	**122**
SR 502 extension, I-5 to NE 10th Avenue*	N/A	N/A	N/A	**33**
TOTAL I-5 Injury Accidents	*399*	*399*	*406*	***410***
TOTAL STUDY AREA	*580*	*585*	*607*	***566***

*Only exists in Preferred Alternative

The simulations resulted in the following conclusions about traffic safety:

- For northbound traffic, any build alternative at NE 179th Street or NE 219th Street would lessen the weaving (compared to the no-build alternative).
- For southbound traffic, the NE 179th SPUI and NE 179th flyover options increase weaving in the peak direction, due to a higher level of traffic using the interchange than in the no-build alternative. The weaving percentage is reduced (compared to the no-build alternative) only for the NE 219th interchange alternatives.
- The preferred operational alternative slightly increases accidents on I-5 over a twenty-year period compared to the No-Build alternative, but reduces accidents overall. Compared to the local improvements alternatives, the preferred operational alternative has little or no negative impact on I-5 accidents while reducing accidents overall.

In the NE 219th interchange alternative, weaving is moderately reduced because traffic destined for Battle Ground from I-5 will likely use the NE 219th Street interchange (instead of NE 179th Street), and will weave to the right north of NE 179th Street. This is a much less dense traffic situation than on the I-205 to NE 179th Street section of I-5. This also should benefit the traffic

entering I-5 north from I-205, because vehicle densities in the right two lanes should be reduced somewhat. This is reflected in the resultant speeds (from CORSIM) and weaving percentages in **Table 4** on page 59. Out of approximately 7,000 PM peak hour vehicles (Year 2025) traveling in this section of I-5, the reduction in weaving vehicles is 70 to 140 vehicles (1-2 percent). Although this percentage is small, with vehicle densities of 40-50 vehicles per lane per mile (LOS E/F in the Highway Capacity Manual), the traffic flow is unstable and at times stop-and-go. A slight change in vehicle maneuvers or weaving may result in noticeable changes in traffic operations and speed.

A similar situation exists for southbound traffic. Traffic entering I-5 from NE 179th Street in the "non-NE 219th Interchange" alternatives must weave across two lanes of I-5 to continue on I-5 south of the I-205 junction. Traffic on I-5 wishing to exit at 134th Street needs to merge to the right south of NE 179th Street, and will mix with traffic entering from NE 179th Street.

Policy Point Six Conclusions: Safety and Operational Analysis

The overall conclusions reached are:

- The preferred operational alternative lessens the weaving problem, and has higher mainline speeds, on I-5 between I-205 and 179th Street better than the other alternatives.
- The preferred operational alternative provides the largest mobility benefits to regional commute, transit, and freight trips on the SR 502 corridor between I-5 and northeast Clark County.
- The preferred operational alternative does not degrade the LOS on I-5.
- On SR 502, the preferred operational alternative provides the highest safety and mobility benefits of any of the alternatives.
- Although the preferred operational alternative has a small increase in accidents on I-5, this alternative reduces overall accidents in the study area.

For corridor accidents on I-5 and SR 502, in the NE 219th interchange alternatives, there is a significant shift of traffic from SR 502 (between NE 179th Street and NE 219th Street) onto I-5, because traffic will use the I-5 mainline to access NE 219th Street. Theoretically, shifting volumes from a facility with a higher accident rate (SR 502) to one with a lower accident rate (I-5) should reduce the overall number of accidents in the corridor.

It is concluded that under the safety and operational analysis, the only alternative that provides maximum safety and operational benefits is preferred operational alternative, which includes a new interchange at NE 219th Street (SR 502 extension) and modernizing the NE 179th Street interchange.

Figure 10. Simulation of Existing Conditions (PM Peak Hour)

Figure 11. Simulation of Year 2005 No-Build Conditions (PM Peak Hour)

Figure 12. Simulation of Year 2005 Preferred Alternative (PM Peak Hour)

Figure 13. 2025 No-Build Traffic Simulation

Figure 14. 2025 Local Improvements Alternative with 179th SPUI

Figure 15. 2025 SPUI Plus Flyovers at 179th

Figure 16. 219th Preferred Operational Alternative

Figure 17. 2025 No-Build – PM Peak Queuing and Level-of-Service

Figure 18. 2025 Local Improvements – PM Peak Queuing and Level of Service

Figure 19. 2025 179th SPUI Plus Flyover – PM Peak Queuing and Level of Service

Figure 20. 2025 Preferred – PM Peak Queuing and Level of Service

POLICY POINT SEVEN: COORDINATION

DM1425 Policy: Are all coordination projects and actions programmed and funded?

Policy Point Seven is intended to ensure that when a new or revised access is generated by new or expanding private development, there is a commitment to ensure the following:

- Appropriate coordination between the proposed development and changes to the transportation system.
- Completion of the non-interchange improvement that is necessary for the interchange to function as proposed.

This analysis concluded that adequate agency coordination is ongoing to ensure consistency in the planning and project development process. No private development proposals are involved in this project.

The project's Steering Committee and Technical Advisory Committee provided agency coordination. The list of the committee members is included on the back side of the cover of this report.

A public involvement process provided outreach and opportunities for public input on study findings and design alternatives.

The most significant aspect of coordination for this project will be between Clark County, WSDOT, and the City of Battle Ground. Clark County has Comprehensive Plan and land use jurisdiction in the vicinity of the interchange. Currently, the Comprehensive Plan designation is primarily rural and agricultural surrounding the interchange. Additionally, the County is considering an interchange area management policy that will provide for mitigation should there be a change in Comprehensive Plan designation(s) in the interchange vicinity. This should protect the integrity of traffic operations on I-5, the NE 219th Street interchange, and SR 502.

WSDOT has jurisdiction over access on SR 502, and is planning for full access control between I-5 and NE 10th Avenue and managed access between NE 10th Avenue and Battle Ground. This should protect traffic operations in the interchange area by limiting access and vehicle conflicts.

The City of Battle Ground considers the proposed interchange important for regional commute trips and commerce between its urban area and I-5. The most significant aspect of coordination for this project will be between Clark County, WSDOT, and C-TRAN. Clark County has Comprehensive Plan and land use jurisdiction in the vicinity of the interchange.

Figure 21 shows the known private and public projects in the interchange vicinity.

Funding

Both the NE 219th Street interchange and NE 179th Street interchange improvements are contained in the Mobility Element of the Washington Highway System Plan (HSP), WSDOT's

20-year highway plan. Safety and access management projects along SR 502 are contained in the Safety element of the HSP.

Pending a finding of engineering and operational feasibility by the FHWA, funding will be sought to initiate the NEPA process to gain federal approval for construction of the NE 219th Street interchange and for the reconfiguration of the NE 179th Street interchange to a single point urban interchange.

The ability of WSDOT and local agency partners to locate full funding for this and similar projects depends upon the outcome of the alternatives analyses conducted during the Access Point Decision Report, and then NEPA. These two federal approval processes necessarily prohibit prior determination of a final project concept. It is difficult, therefore, to secure advance funding. However, appropriate commitments by WSDOT and local partners are in place to ensure timely and coordinated funding of all project elements.

In anticipation of future interchange improvements, Clark County has initiated arterial improvements within the project area. The county has completed design of the widening of NE 179th Street between NW 11th Avenue and NE 29th Avenue, through the 179th Street interchange area. The county has also completed design for a new north-south collector arterial, NE 17th Avenue/Union Road, which would being on Union Road at approximately the crossing over Whipple Creek and end at NE 179th Street, approximately 0.25 mile east of the interchange. Funding is being sought through development traffic impact fees, other public and private sources, and grant funds to construct these improvements.

Development

At this time, there are no development proposals influencing the need for the access modification.

The county is considering funding in the near future to construct a new north-south collector arterial, NE 17th Avenue/Union Road, which would being on Union Road at approximately the crossing over Whipple Creek and end at NE 179th Street, approximately 0.25 mile east of the interchange.

Agency Coordination

Coordination between agencies has occurred at various levels during the Access Decision Study. These include:

- Steering Committee: FHWA, Clark County, C-TRAN, WSDOT, Battle Ground and RTC are members of the Access Decision Study Steering Committee. Agency representatives have reviewed design and operational alternatives.
- Development Review: WSDOT coordinates with Clark County on the development review process including any proposals in the interchange vicinity.

- Project Coordination: through staff meetings and the Steering Committee, Clark County and WSDOT have been coordinating with the consultants on this new and modified access study and agency staff on a variety of issues including design and transportation concurrency.
- Funding: through the regional planning process and the Steering Committee, FHWA, Clark County, WSDOT, C-TRAN, and RTC have discussed funding strategies for I-5 improvements that would include the NE 219th Street interchange. RTC, through the Metropolitan Transportation Plan priorities process, has identified I-5 improvements as one of the region's top Interstate priorities.

Public Involvement

General information

The project team held five open houses to share project information with the community, and to listen to input from those directly affected by the project. The open houses were held in March 1999, May 1999, October 1999, August 2000, and November 2000 at a variety of locations and activity centers in the project area.

Generally, public comments regarding the NE 179th Street interchange and the proposed 219th Street interchange include:

- Events at the County Fairgrounds, and future traffic from the proposed Amphitheatre at the fairgrounds, would overload that interchange. Users of the existing interchange would like an alternative to bypass event-related traffic congestion.
- Current and future congestion at the NE 179th Street interchange, and along SR 502 into Battle Ground, continues to worsen. Many felt that the NE 219th Street interchange would provide relief for those trips.
- Landowners in the interchange vicinity are concerned about access to the public roadway system and potential impacts on their land.

Private Sector Commitments

There are no private sector commitments as part of this proposal. Development proposals are being reviewed and coordinated, to ensure that they will not preclude the preferred operational alternative from occurring.

Policy Point Seven Findings: Coordination

Through the Steering Committee and local agency processes, Clark County and WSDOT have developed an interagency coordination process to identify the transportation improvements, mitigation, project phasing, funding and construction responsibilities, and transportation demand management and transportation system management commitments necessary to ensure that the revised access will function as intended.

Figure 21. Public and Private Development Proposals in Interchange Vicinity

POLICY POINT EIGHT: PLANNING AND ENVIRONMENTAL PROCESSES

DM1425 Policy: What is the status of the proposal's planning and environmental processes?

Guidance requires an analysis of environmental impacts to support a federal action (FHWA's finding of operational acceptability of the access modification request).

An environmental alternatives analysis (EAA) was conducted to:

- Coordinate the planning and environmental processes, including the National Environmental Policy Act (NEPA), with design and operational determinations.
- Describe potential environmental impacts of the alternatives that may affect design and operational analysis.

This analysis concluded that the preferred operational alternative is consistent with local planning processes and that the project can mitigate for any environmental impacts it may create.

Coordinating planning with environmental processes is described in this chapter. Also included is a description of the potential environmental impacts associated with the proposed access modification. Further detail on the environmental resources and potential impacts is provided in **Appendix F**.

Planning and Environmental Review

Process

An environmental study plan was drafted and distributed to the Project Steering Committee in February 2001. This plan provided guidelines for an environmental alternatives analysis that would be conducted to support this report. The environmental alternatives analysis serves as a preliminary environmental screening of alternative design options that will be evaluated in the *Access Decision Report*.

Status

A more comprehensive environmental analysis of the alternatives, including compliance with NEPA, the Endangered Species Act, Section 404 of the Clean Water Act, the Clean Air Act, and other applicable federal, state, and local regulations, will occur after a finding of operational and engineering acceptability by the FHWA is made. At that time, the class of action (I, II, or III) for the project will be determined, which will prescribe the level of documentation needed for the NEPA process. Subsequent steps in the environmental review will include drafting, circulating and finalizing the NEPA document; incorporating public input; submitting the document for approval; and obtaining other applicable permits and approvals.

Study Area

The study area analyzed in the EAA includes the following areas:

- The NE 179th Street interchange along Interstate 5 (I-5)
- A proposed new NE 219th Street interchange along I-5
- The SR 502 corridor along NE 10th Avenue
- The SR 502 corridor along NE 219th Street
- The NE 199th Street corridor from the intersection with NE 10th Avenue (west limits) to the intersection with SR 503 (east limits)
- The NE 179th Street corridor from the I-5 interchange (west limits) to the potential extended intersection with SR 503 (east limits)

The study area analyzed in the EAA was defined as 500 feet on each side of the centerline for mainline Interstate 5 (I-5). At interchanges (current and proposed), the study corridor width extends 1,000 feet on each side of the I-5 centerline. The length of the study corridor runs from NE 179th Street to SR 501/NW Pioneer Street.

For the proposed NE 219th Street interchange, the area between NW 11th Avenue, crossing the I-5 mainline, and ending at NE 10th Avenue will also be included in the study corridor at a width of 100 feet on each side of the NE 219th Street extension.

The SR 502 corridor from NE 10th Avenue to the west Battle Ground City Limits (approximately SR 502 at NE 102nd Avenue) will be a separate study corridor considered in the EAA due to the future potential widening of this route as a result of interchange improvements. Additionally, alternative corridors for potentially realigning SR 502 are being studied. Two corridors are being considered: NE 179th Street and NE 199th Street. The study area width for all corridors was 100 feet on each side of centerline.

Critical Environmental Resources

The Project Steering Committee identified the following critical environmental resources for early consideration in the project planning and design process: wetlands, fish passage, cultural resources, and hazardous material sites. A preliminary analysis of these resources was completed to determine whether any environmental fatal flaws were included in the design options being considered.

The methods used to identify and evaluate each of the critical resources are briefly summarized as follows:

- Wetlands and fish passage areas were identified and characterized by using available records (aerial photographs, wetland inventories, and soil surveys) and by performing limited field reconnaissance for areas within public rights-of-way.
- Cultural resources were identified through a literature search of documents on file at the Washington State Office of Archaeology and Historic Preservation.
- Hazardous material sites were identified through searches of regulatory databases, review of site files maintained by the Washington Department of Ecology, and limited reconnaissance activities.

Potential Environmental Issues

The proposed access modification (Options 4-7) is expected to have the following potential environmental issues:

- 16-24 acres of mitigated wetlands replacement[i];
- 4-7 culvert crossings;
- 0-1 cultural resource sites[ii]; and
- 13 hazardous material sites[iii].

A more detailed description of the study methods, results, and conclusions as well as an environmental screening of all design options is provided in **Appendix F**.

Wetlands

Wetland impacts from the preferred operational alternative would include:

- Approximately 9 acres of wetland replacement for the modifications of the NE 179th Street interchange (single point urban interchange and realignment of Delfel Road), and
- Approximately 7 acres of wetland replacement for a new NE 209th Street interchange or approximately 14-16 acres of wetland replacement for a new NE 219th Street interchange.

Culvert Ratings for Fish Passage

The proposed access modification would affect 4-7 culverts, which include 1 rated as high quality, 2-4 rated as medium quality, and 2 rated as low quality. The high quality culvert located at the Gee Creek Rest Area would require attention during construction to maintain its current function. Direct impacts to fish passage and habitat associated with the medium and low quality culverts would be minimal due to the degraded habitat or upstream and downstream stream conditions.

Cultural Resources

The proposed access modification could potentially impact one historic site. When the specific alternatives are developed in a later stage of the project, this site would need to undergo a comprehensive investigation that examines all ground surfaces.

If the project planning process cannot assure the avoidance of prehistoric archaeological sites during construction, these cultural resources would need to be evaluated for their potential significance in relation to the criteria established for the National Register of Historic Places. As part of another unrelated development occurring in the vicinity, two of the three sites are currently being evaluated for eligibility for the National Register. If any site is determined to be eligible or potentially eligible for listing on the National Register, then appropriate mitigation may be necessary. Data recovery of a portion of the deposits of prehistoric archaeological sites may be required.

All investigations—including inventory, evaluation and determination of significance, and mitigation—will need to be coordinated with the Washington State Office of Archaeology and Historic Preservation and the President's Advisory Council on Historic Preservation, if federal funds or permits are required.

Hazardous Material Sites

A total of three documented release sites and ten potential release sites would potentially be affected by the proposed access modification. The sites of most concern (high potential sites) are those that have soil or groundwater contamination located within or adjacent to proposed construction areas. The proposed access modification has one site of high potential impact: Z-Mart/Texaco.

Other Considerations

As described in Policy Point 2, the proposed access modification is consistent with local planning requirements.

Impacts to air quality were considered in terms of levels of service that correspond to the preferred operational alternative. The interchange improvements and access modification of the preferred operational alternative are contained in the transportation network which was modeled under air quality regulations to ensure conformity with air quality standards and the *State Air Quality Implementation Plan* for Clark County.

Policy Point Eight Conclusions: Planning and Environmental Process

A preliminary assessment of critical environmental resources has been undertaken to identify potential areas where avoidance or mitigation would likely need to be applied. Coordination with planning and environmental processes is on going with the design and operational determinations. A full analysis of environmental impacts will be undertaken at a later planning stage to comply with applicable federal, state and local regulations. The preferred operational alternative is expected to have potential impacts on land use, air quality, wetlands, water resources and vegetation.

[i] Mitigated replacement of wetlands is calculated by multiplying the area of expected wetland fill by a mitigation replacement ratio for each wetland category based on Washington Department of Ecology guidelines (1998). The mitigated replacement quantity is used at this early planning stage to provide a comparable measure for each design option. Other mitigation measures may actually be employed and would be determined in later project stages.

[ii] Cultural resource sites include archaeological sites and historic structures on file with the Washington State Office of Archaeology and Historic Preservation.

[iii] Hazardous material sites include documented release sites and potential release sites that are registered with the Washington Department of Ecology.

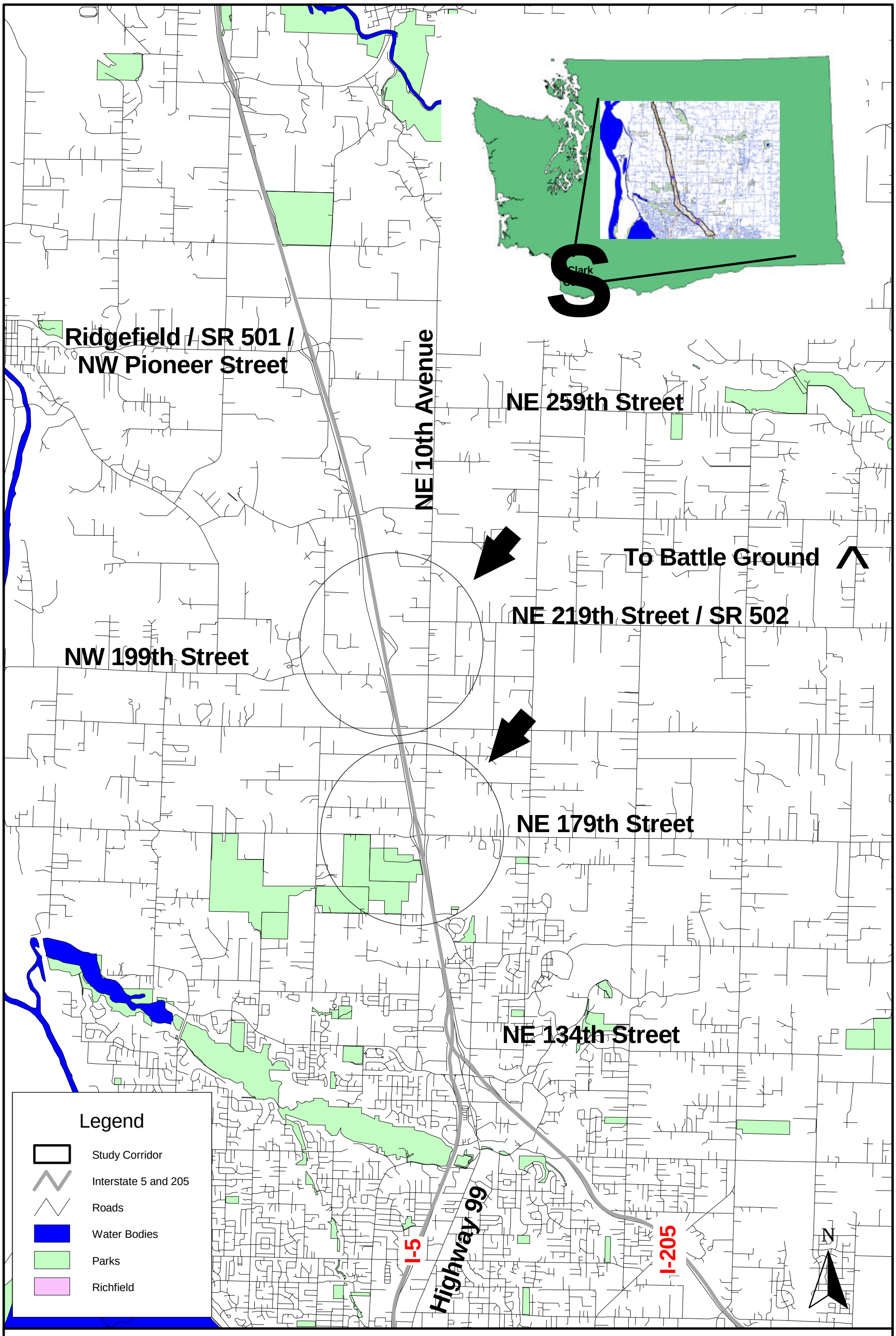

Figure 1
I-5 Between 179th Street and Ridgefield Study Area

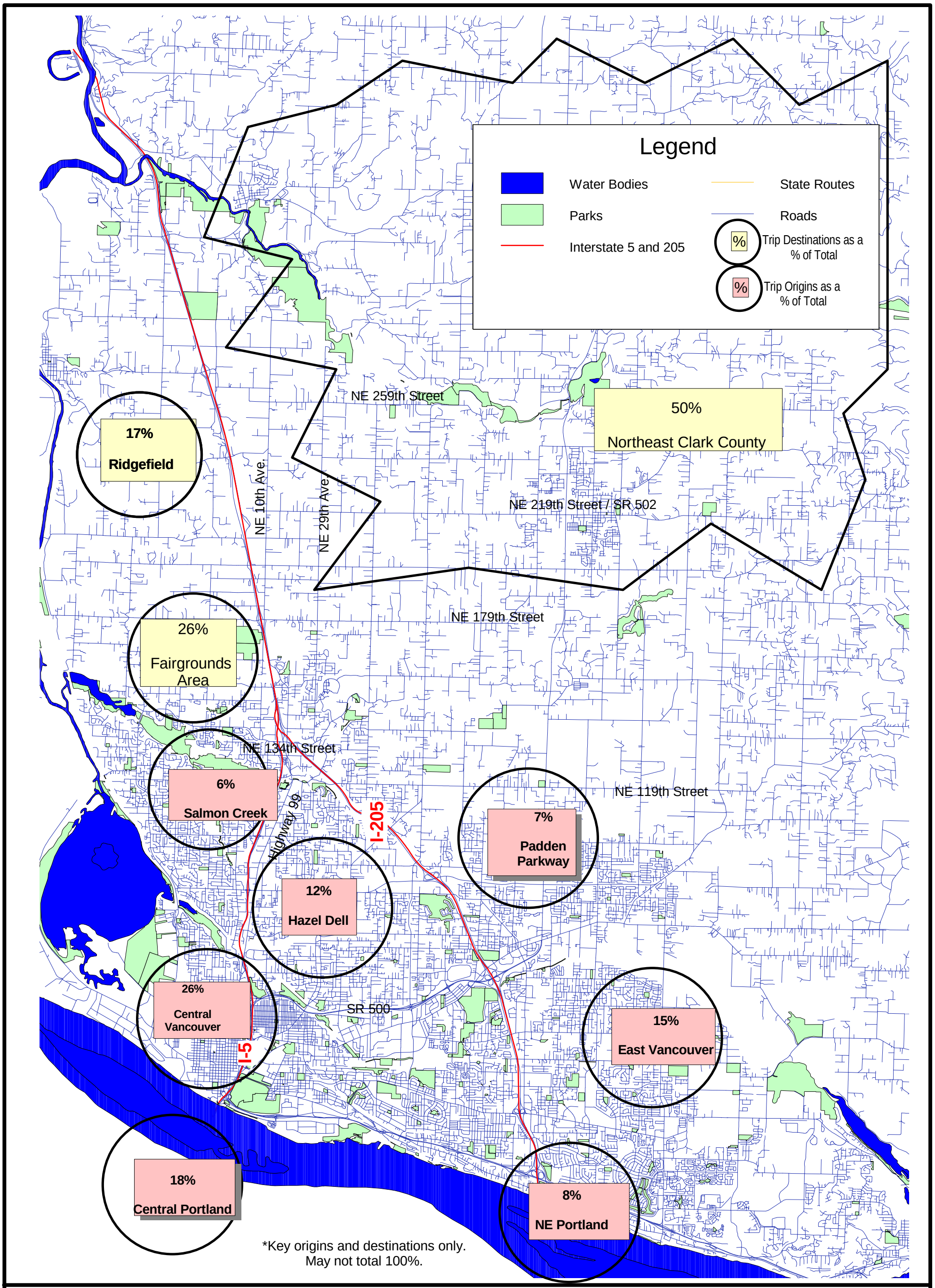

Figure 2
179th Street Interchange
Year 2025 PM Peak
Trip Origins and Destinations

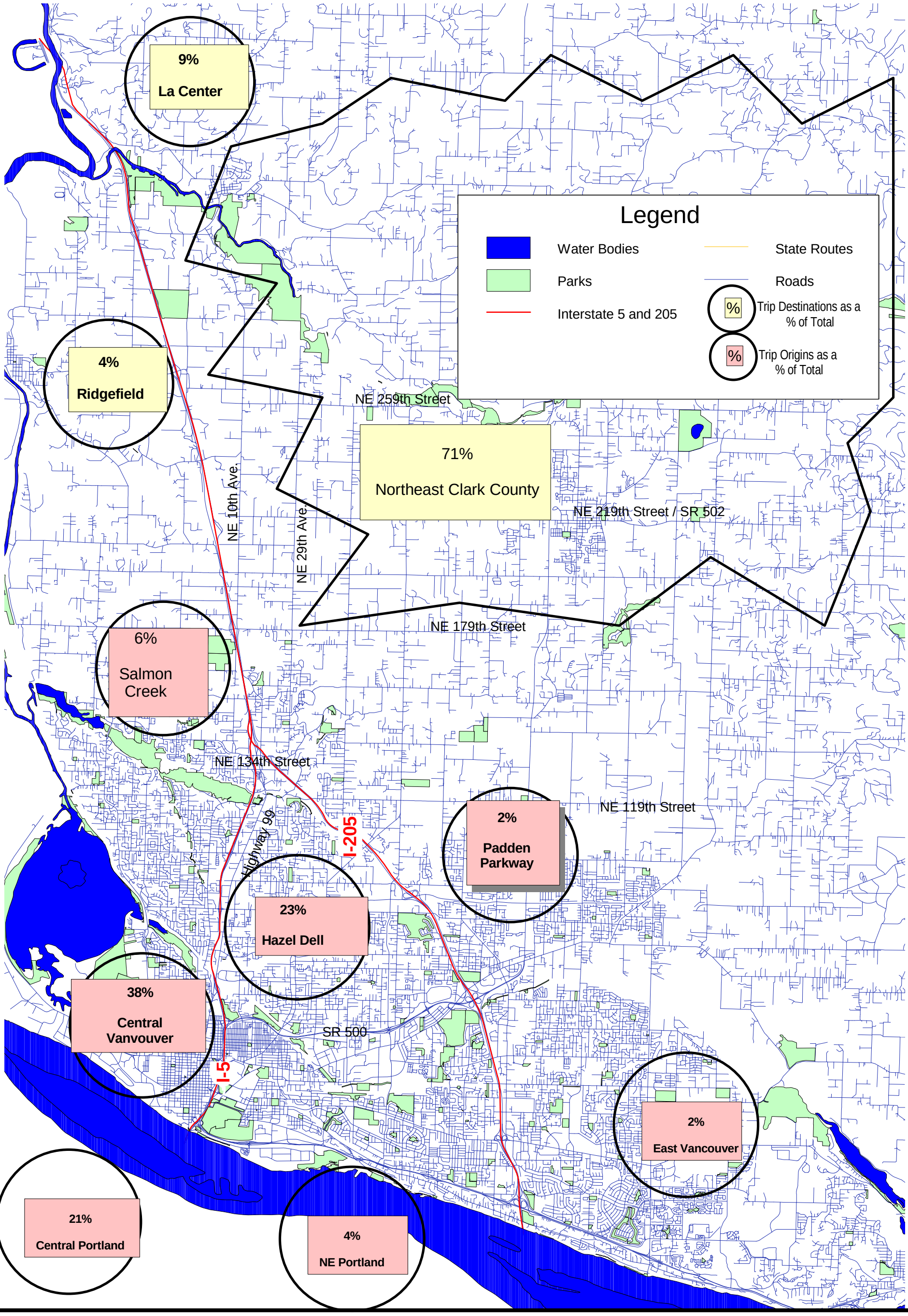

Figure 3
219th Street Interchange
Year 2025 PM Peak
Trip Origins and Destinations

N

*Key origins and destinations only. May not total 100%.

DESIGNED BY:	C. HEMMER	1-31-01
CHECKED BY:	H. LI	2-7-01
SCALE:	1"=500'	

PB

Washington State Department of Transportation

FIGURE 4

219TH - PREFERRED OPERATIONAL ALTERNATIVE (OPTION A)

DESIGNED BY:	C. HEMMER	1-31-01
CHECKED BY:	H. LI	2-7-01
SCALE:	1"=500'	

PB

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FIGURE 5

219TH - PREFERRED OPERATIONAL ALTERNATIVE (OPTION B)

DESIGNED BY:	C. HEMMER	1-31-01	Washington State Department of Transportation
CHECKED BY:	H. LI	2-7-01	
SCALE:	1"=500'		

FIGURE 6

219TH - PREFERRED OPERATIONAL ALTERNATIVE (OPTION C)

DESIGNED BY:	C. HEMMER/T. MCKERLICK	09-24-01
CHECKED BY:	H. LI	09-30-01
SCALE:	1"=250'	

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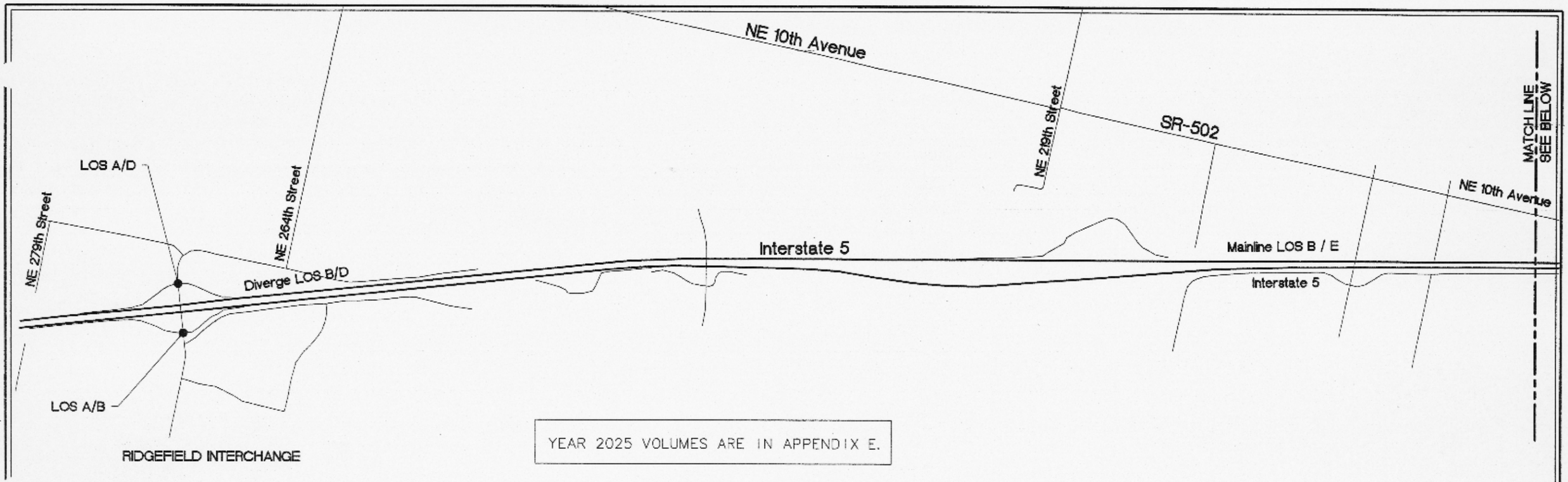
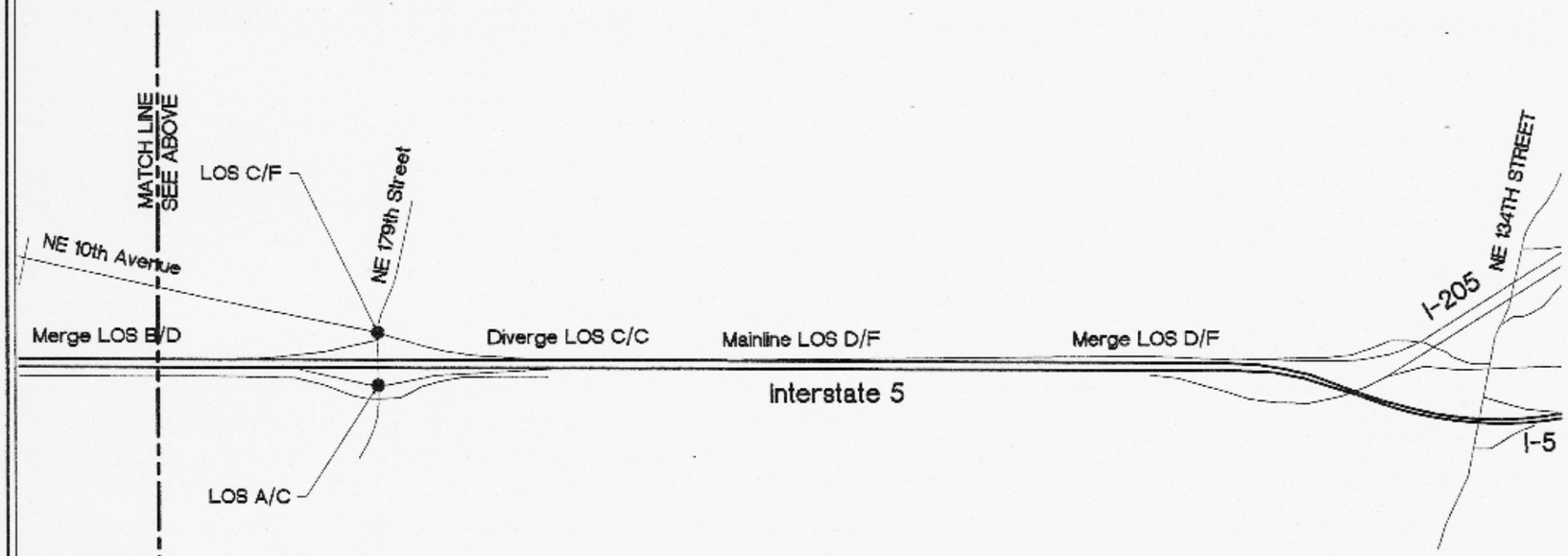
FIGURE 7

179TH INTERCHANGE - PREFERRED OPERATIONAL ALTERNATIVE





LEGEND

LOS A / B 1998/2025 NO BUILD LEVEL OF SERVICE

DESIGNED BY:	J. Rosales	12/31/01
CHECKED BY:	C. Green	01/15/02
SCALE:	NTS	

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Figure 9 I-5/179th St and 219th St Interchange

Existing and Projected - PM Peak Level of Service - No-Build

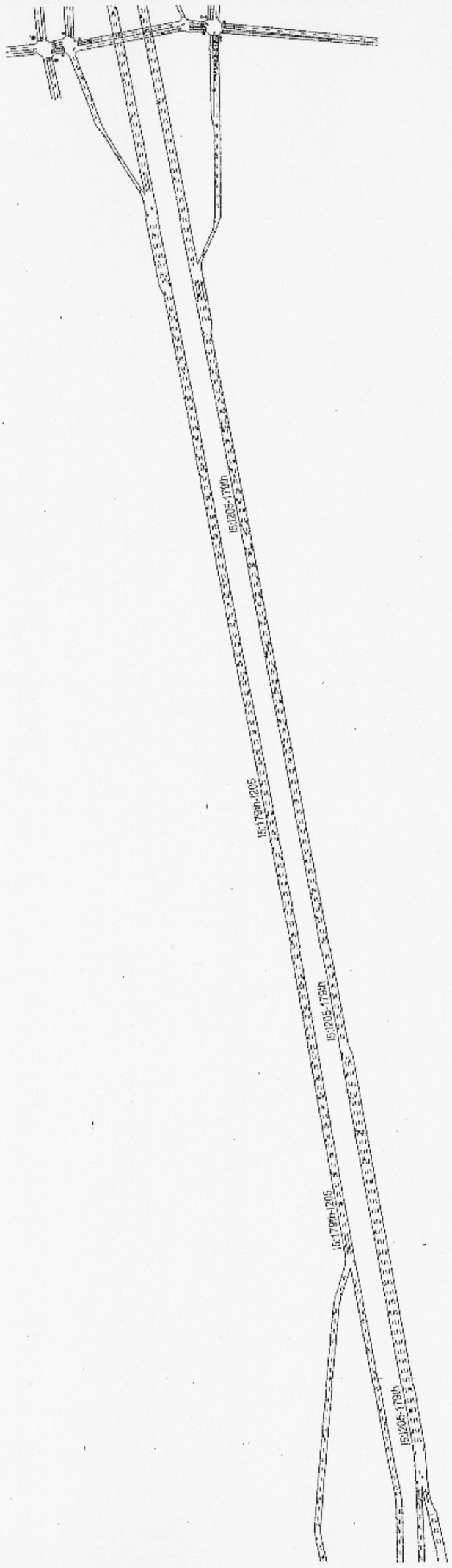


Figure 10
Simulation of Existing Conditions (PM Peak Hour)

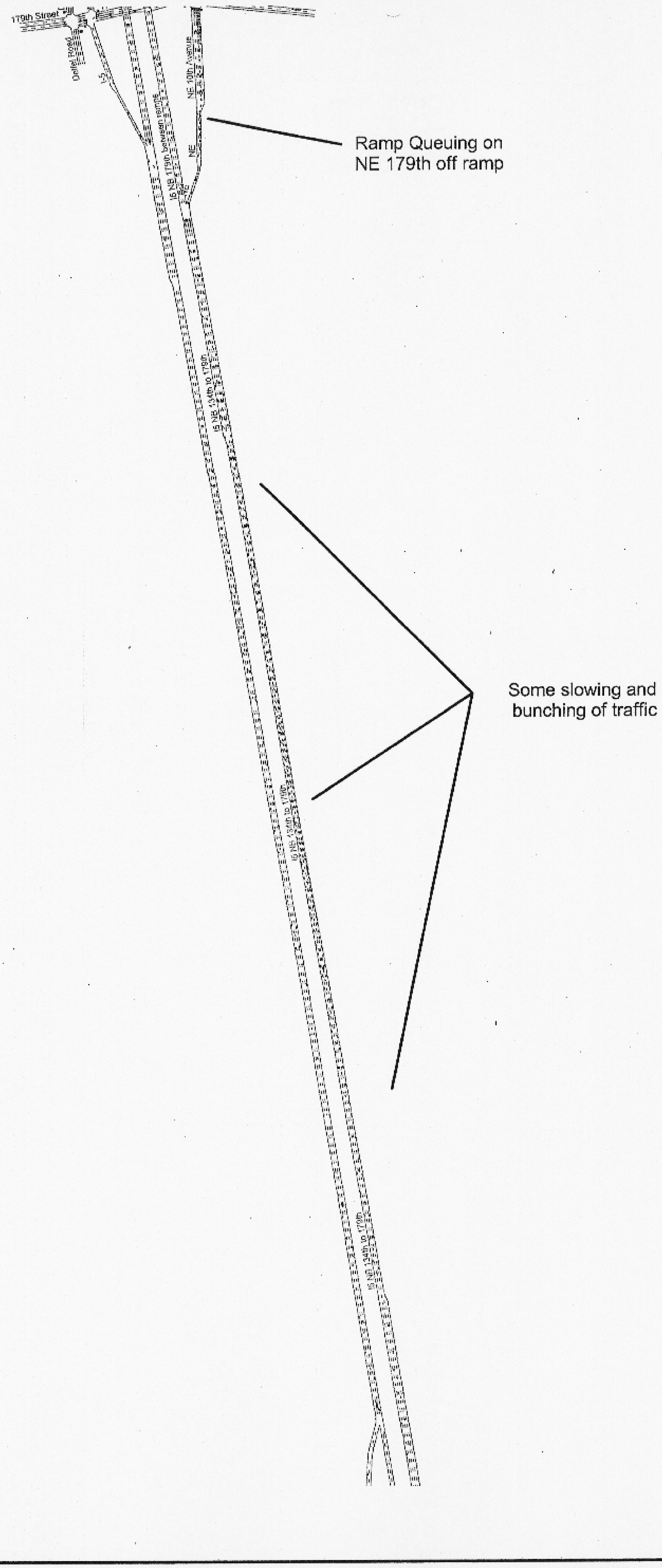


Figure11
Simulation of Year 2005
No-Build Conditions (PM Peak Hour)

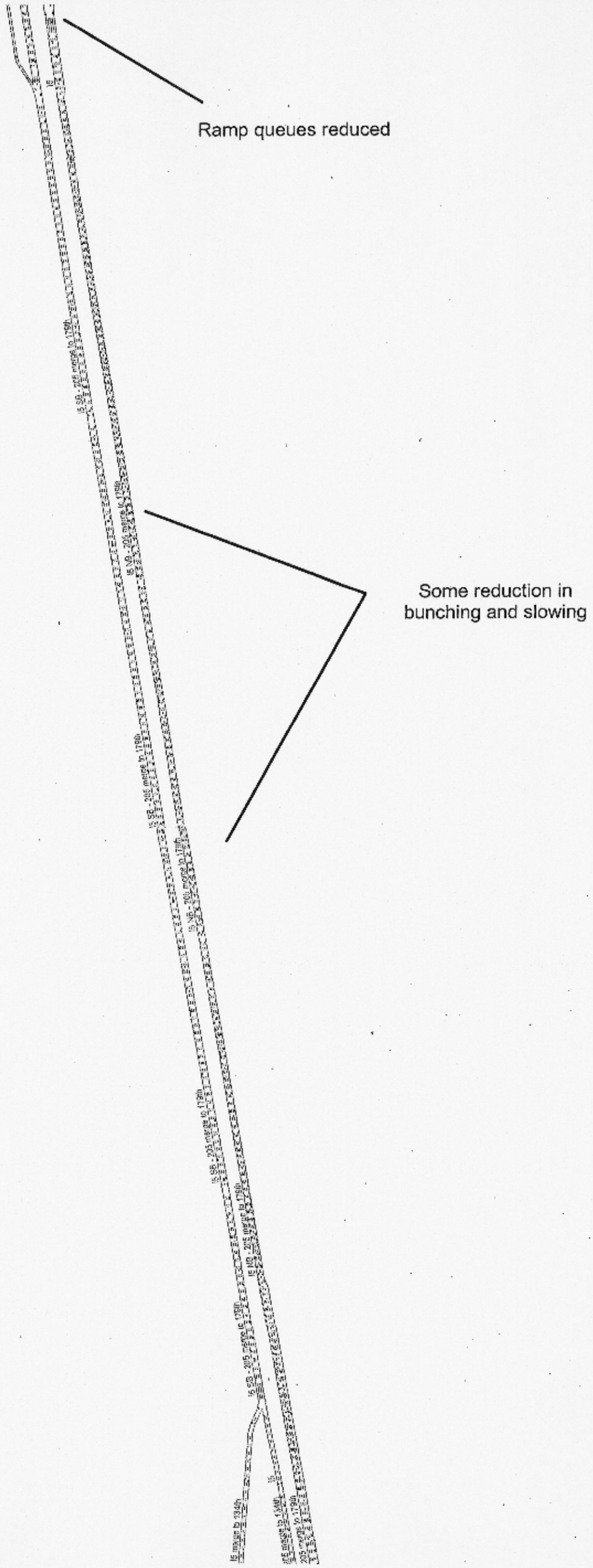


Figure12
Simulation of Year 2005
Preferred Alternative (PM Peak Hour)

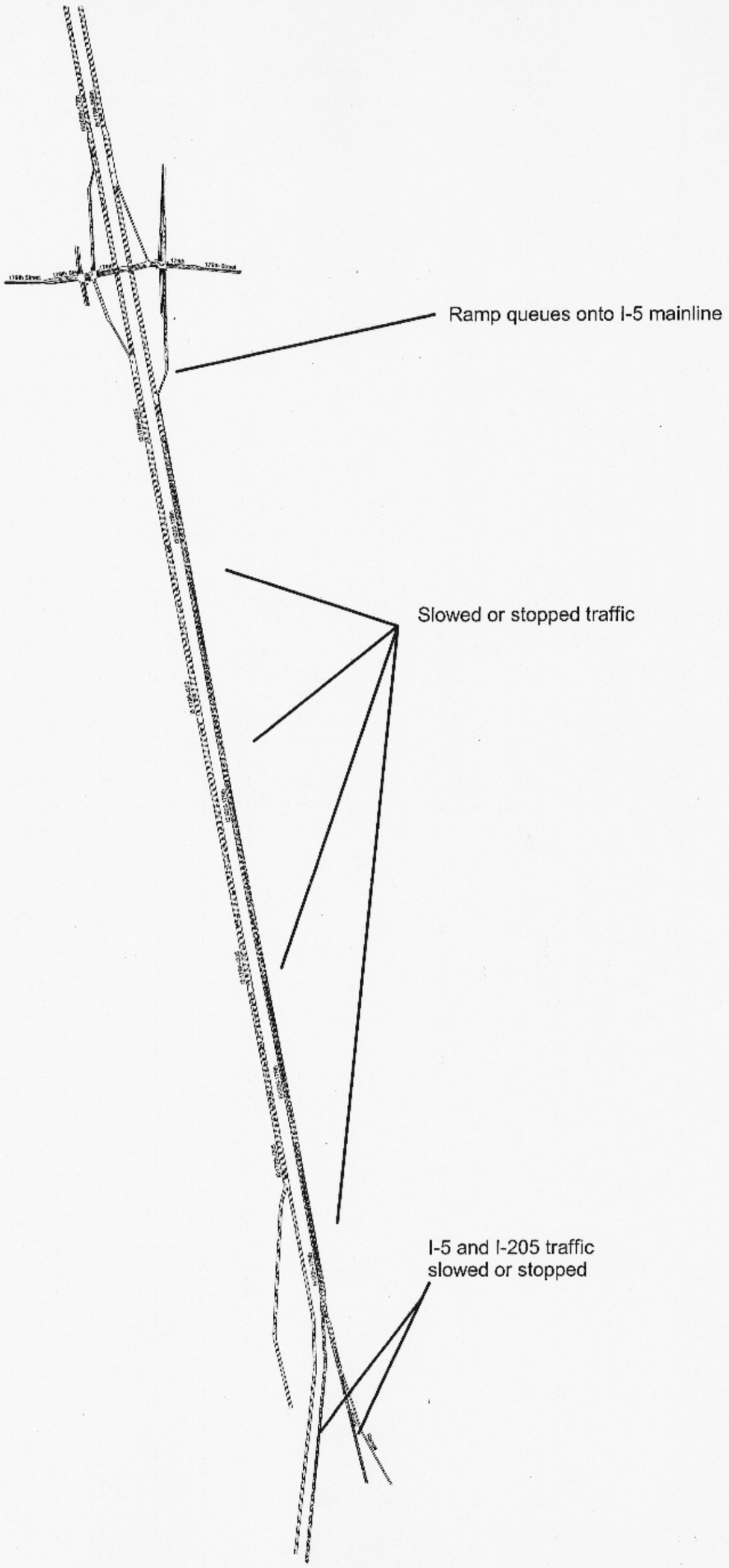


Figure 13
2025 No-Build Traffic Simulation*

* Snapshot simulation midpoint of PM peak hour

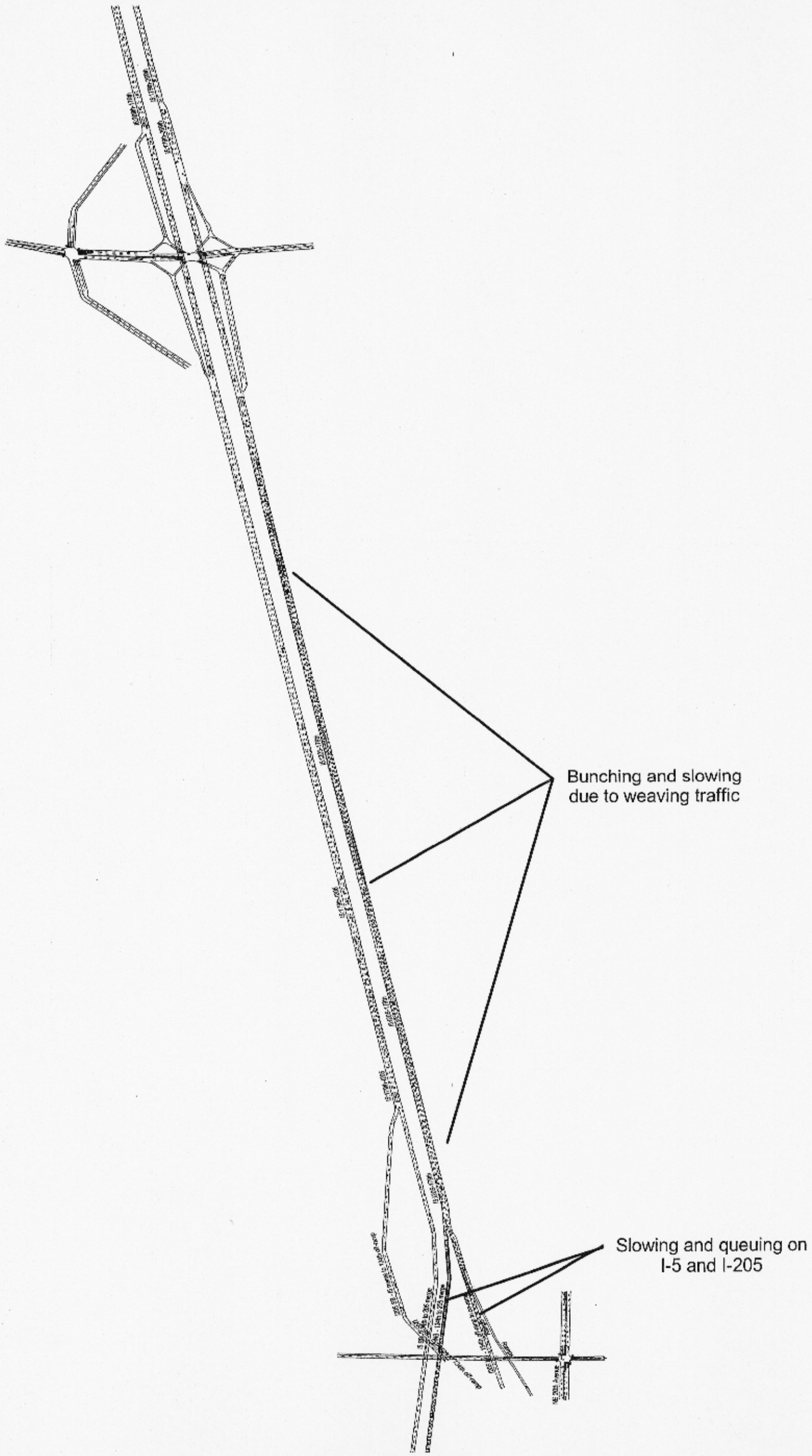


Figure 14
2025 Local Improvements Alternative
with 179th SPUI

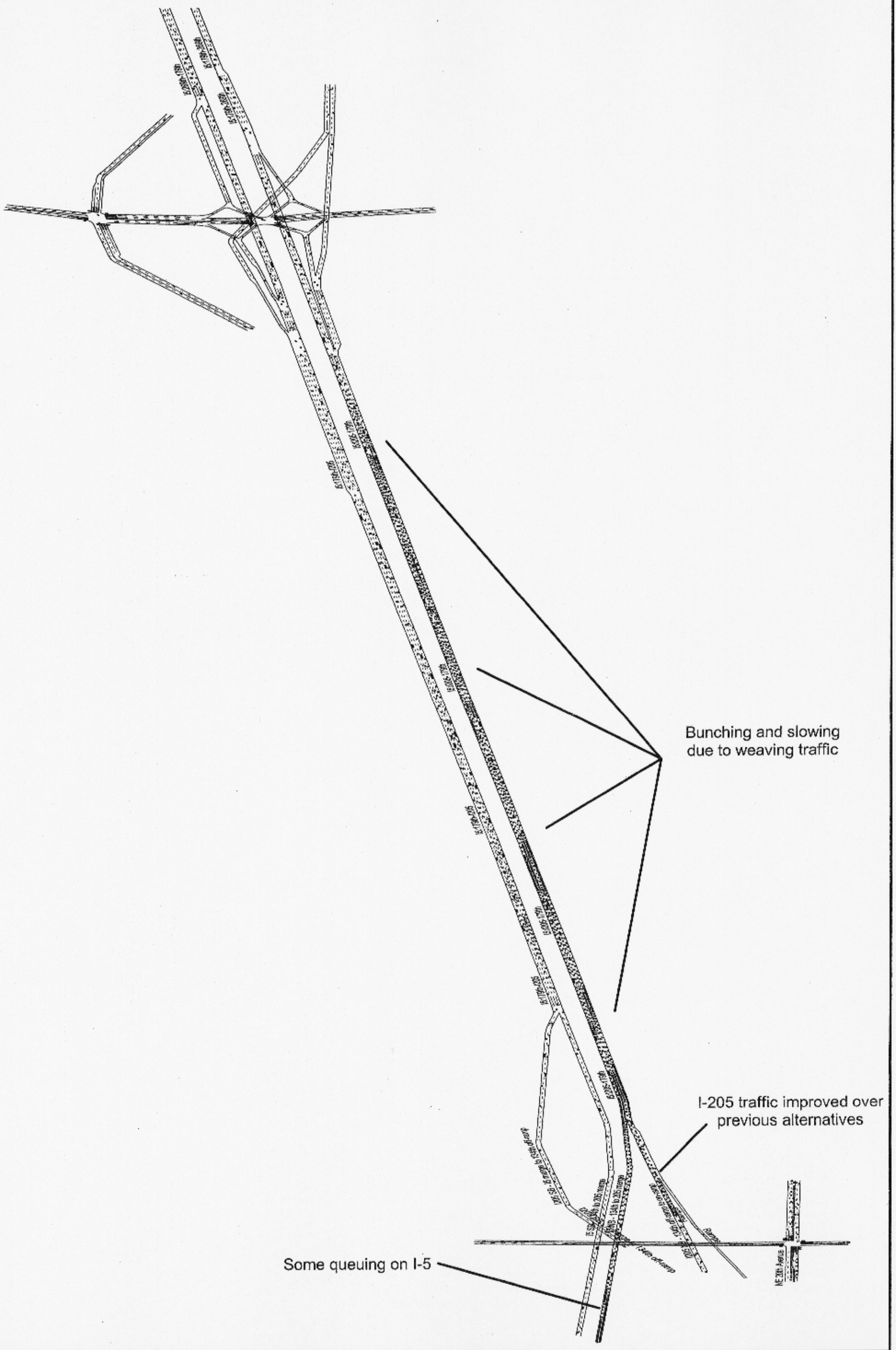


Figure 15
2025 SPUI Plus Flyovers at 179th

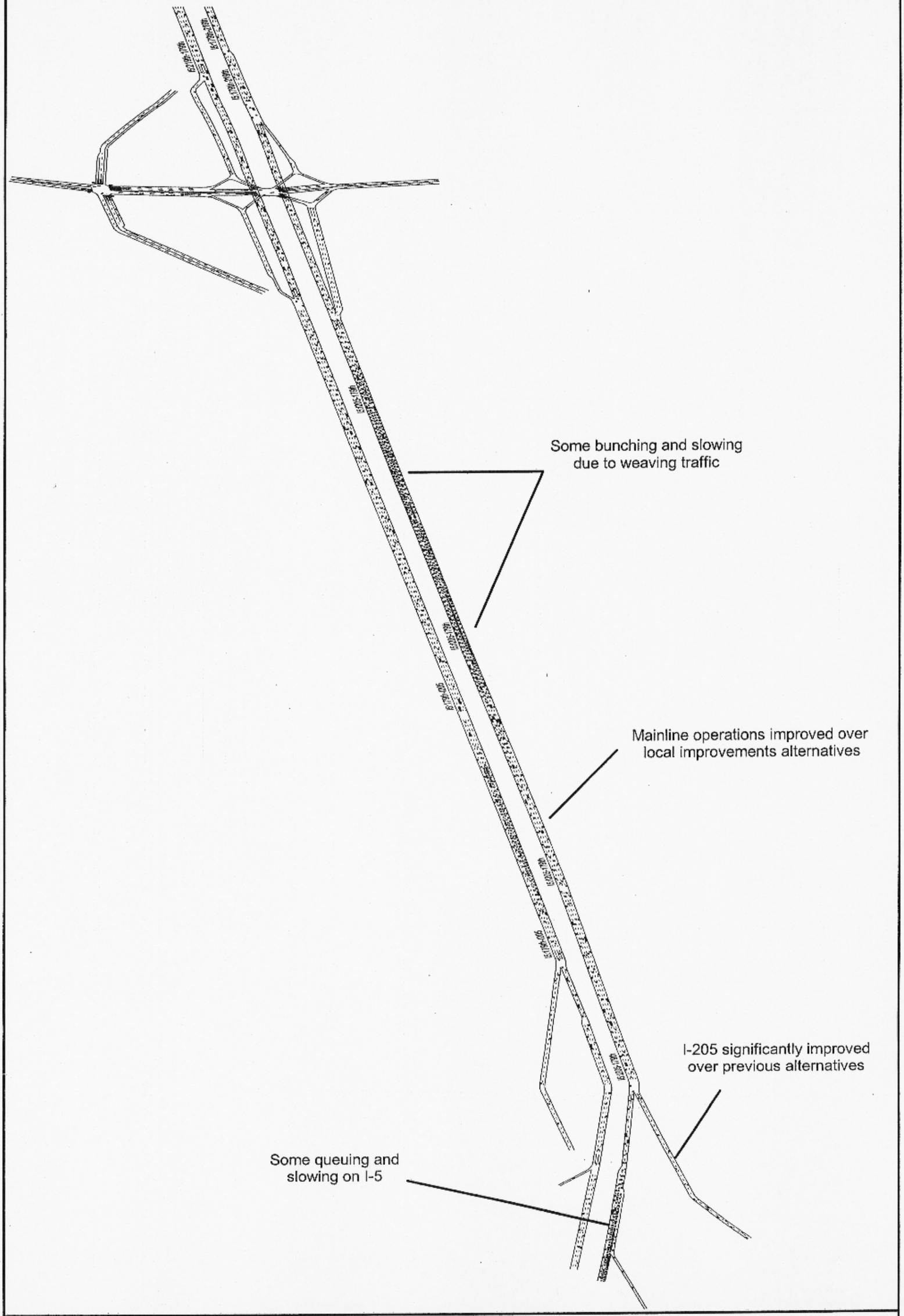


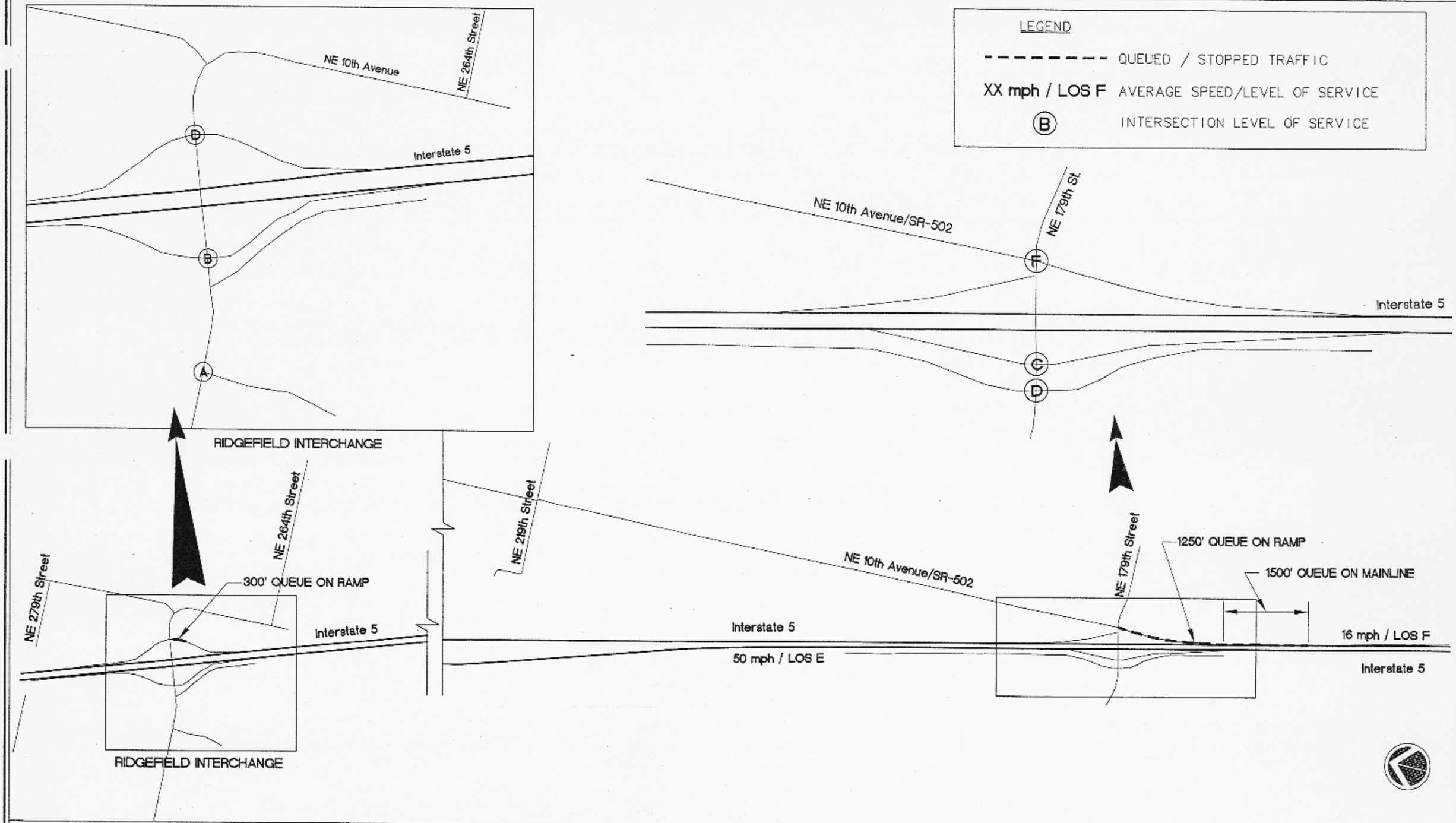
Figure 16
219th Preferred Operational Alternative

LEGEND

QUEUED / STOPPED TRAFFIC

XX mph / LOS F AVERAGE SPEED/LEVEL OF SERVICE

(B) INTERSECTION LEVEL OF SERVICE



DESIGNED BY:	J. Rosales	12/01/01
CHECKED BY:	C. Green	01/15/02
SCALE:	NTS	

Washington State Department of Transportation

Fig 17 - I-5 179th St and 219th St Interchange

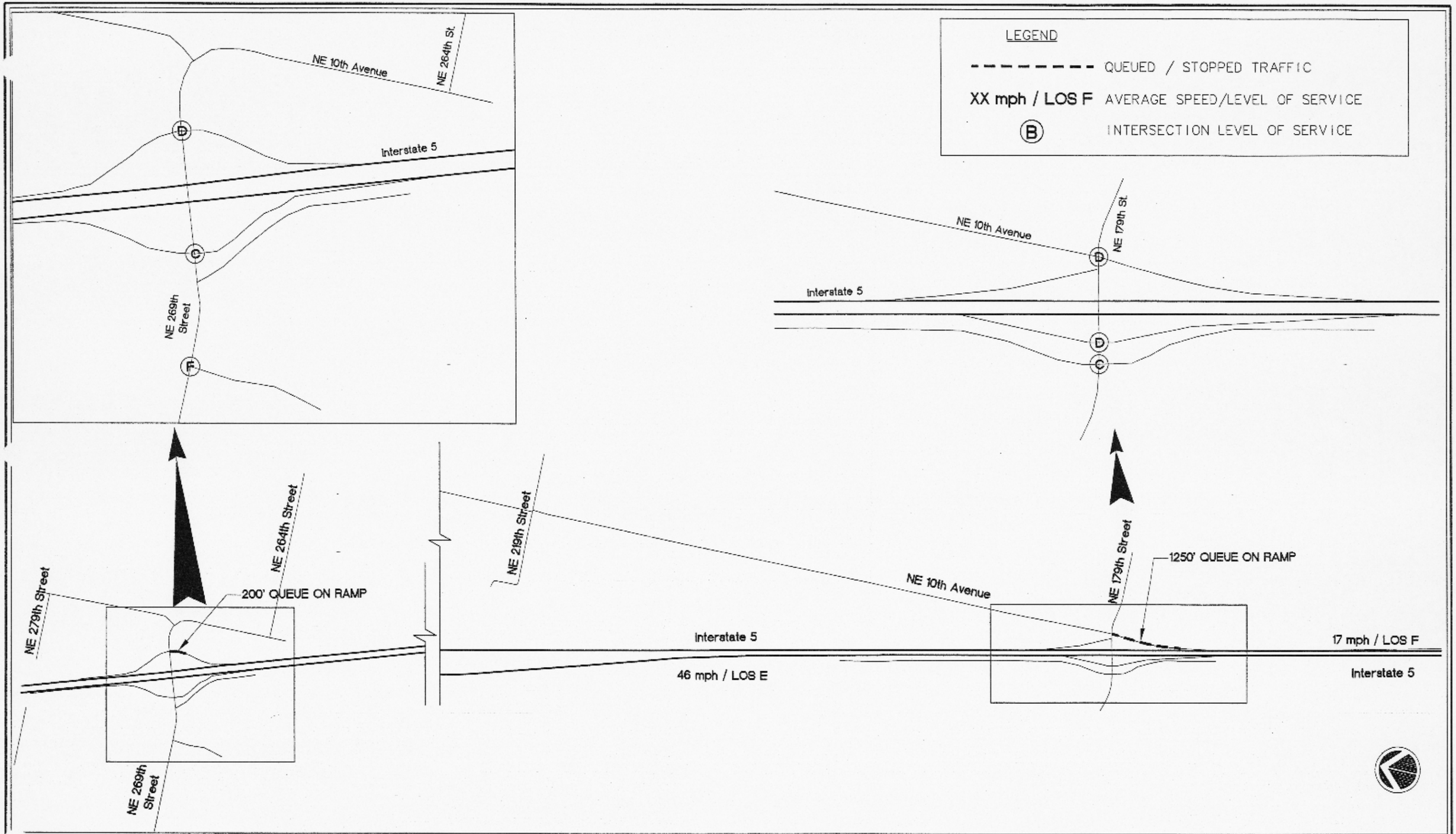
2025 No-Build - PM Peak Queuing and Level of Service

LEGEND

- - - - - - - - QUEUED / STOPPED TRAFFIC

XX mph / LOS F AVERAGE SPEED/LEVEL OF SERVICE

(B) INTERSECTION LEVEL OF SERVICE



DESIGNED BY:	J. Rosales	12/01/01
CHECKED BY:	C. Green	01/15/02
SCALE:	NTS	

Washington State Department of Transportation

Fig 18 - I-5 179th St and 219th St Interchange

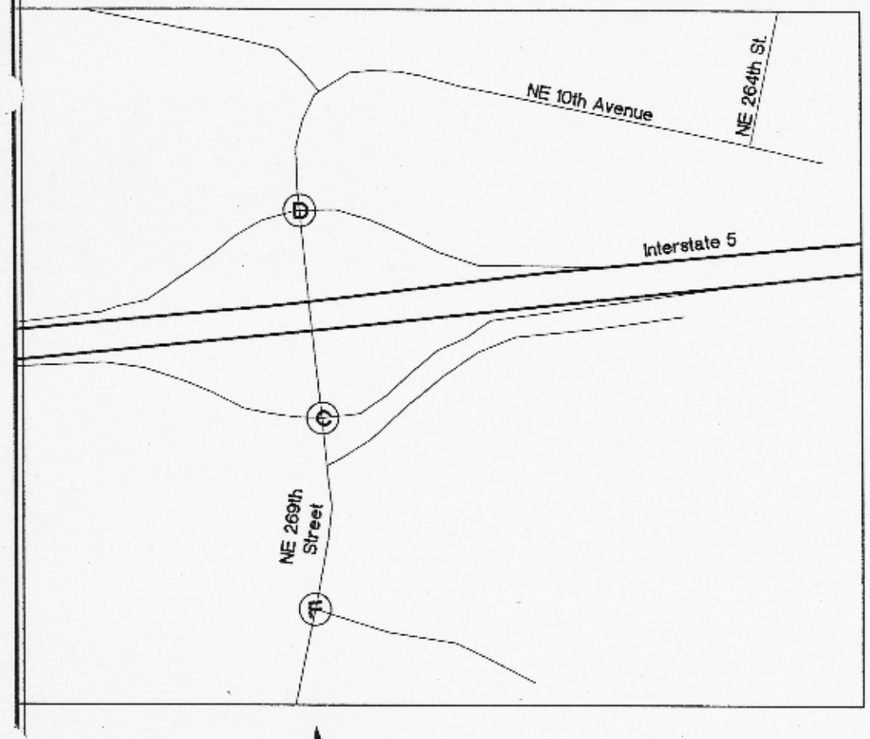
2025 Local Improvements - PM Peak Queuing and Level of Service

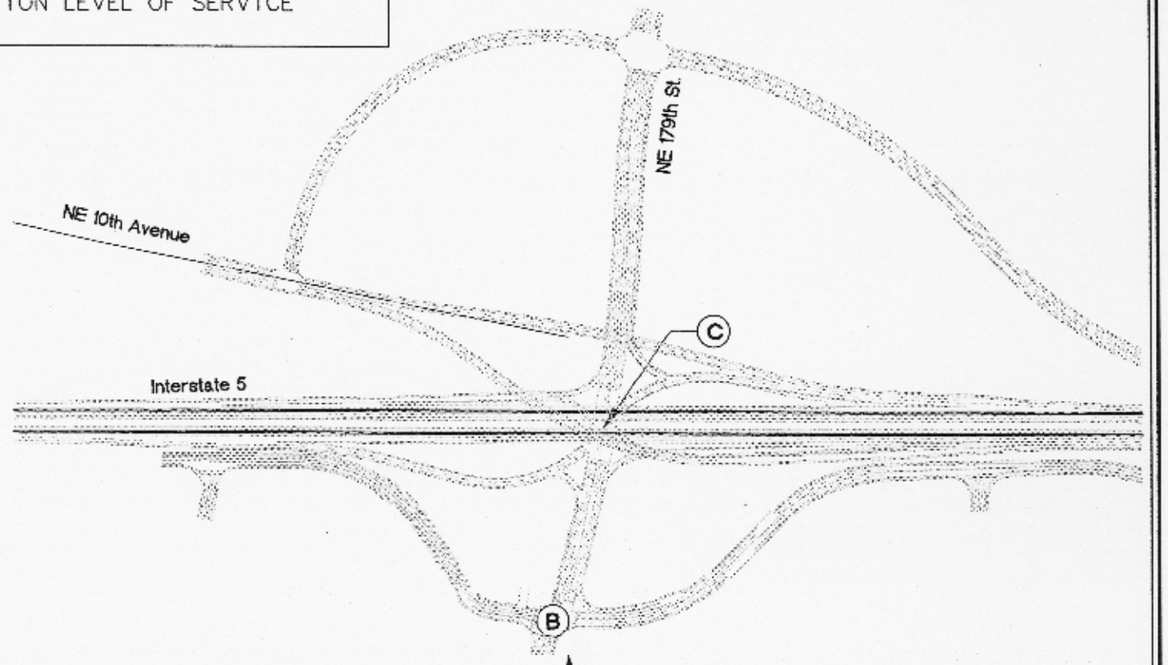
LEGEND

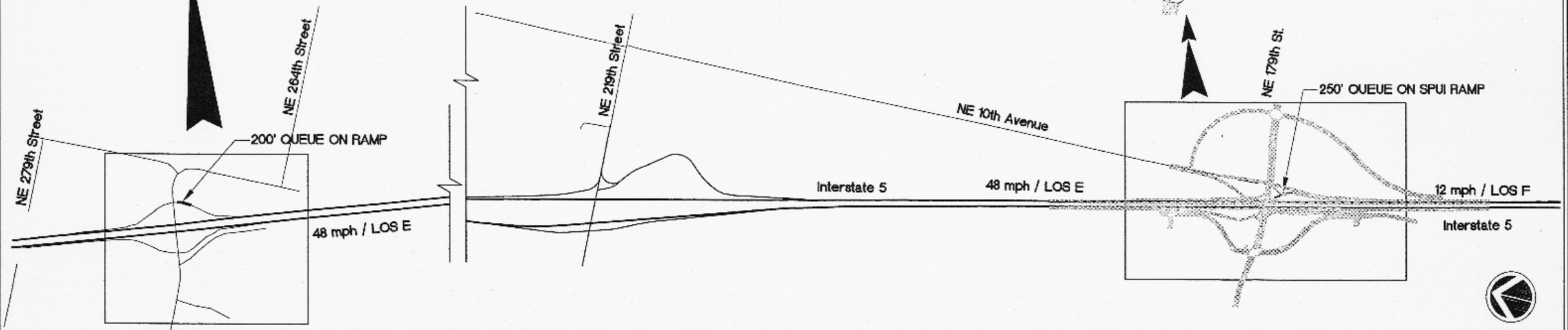
- - - - - - - - QUEUED / STOPPED TRAFFIC

XX mph / LOS F AVERAGE SPEED/LEVEL OF SERVICE

(B) INTERSECTION LEVEL OF SERVICE







DESIGNED BY:	J. Rosales	12/01/01
CHECKED BY:	C. Green	01/15/02
SCALE:	NTS	

PB

Washington State Department of Transportation

Fig 19 - I-5 179th St and 219th St Interchange

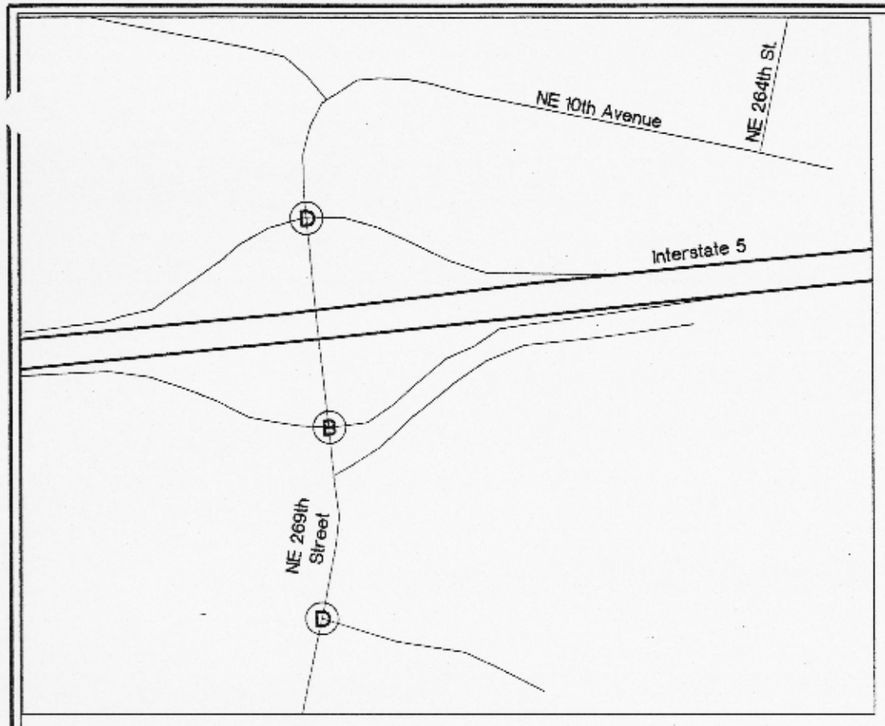
2025 179th SPUI Plus Flyover - PM Peak Queuing and Level of Service

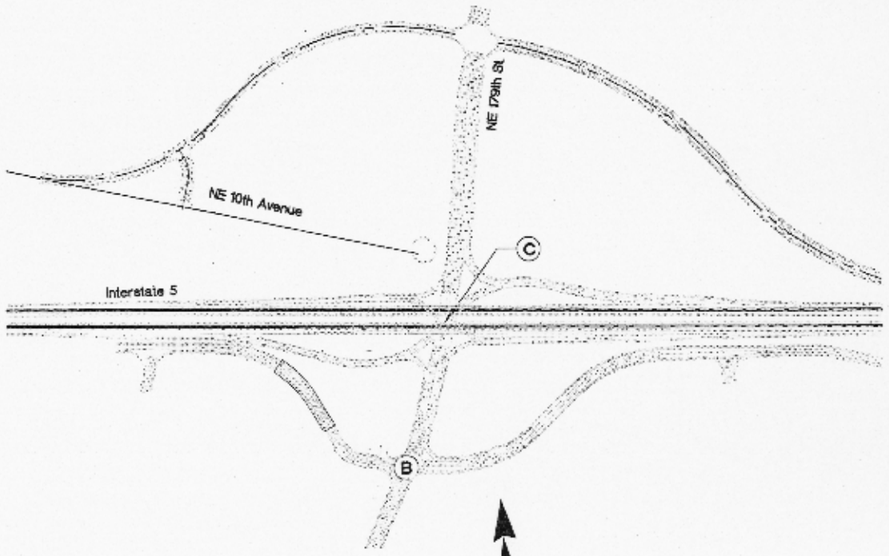
LEGEND

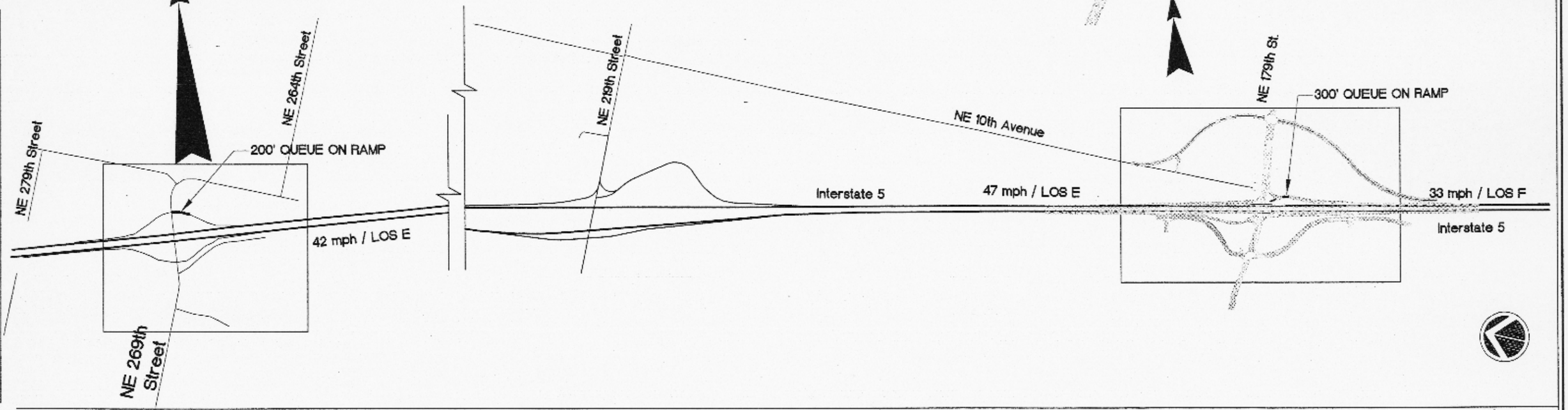
QUEUED / STOPPED TRAFFIC

XX mph / LOS F AVERAGE SPEED/LEVEL OF SERVICE

(B) INTERSECTION LEVEL OF SERVICE







DESIGNED BY:	J. Rosales	12/01/01
CHECKED BY:	C. Green	01/15/02
SCALE:	NTS	

PB

Washington State Department of Transportation

Fig 20 - I-5 179th St and 219th St Interchange

2025 Preferred - PM Peak Queuing and Level of Service

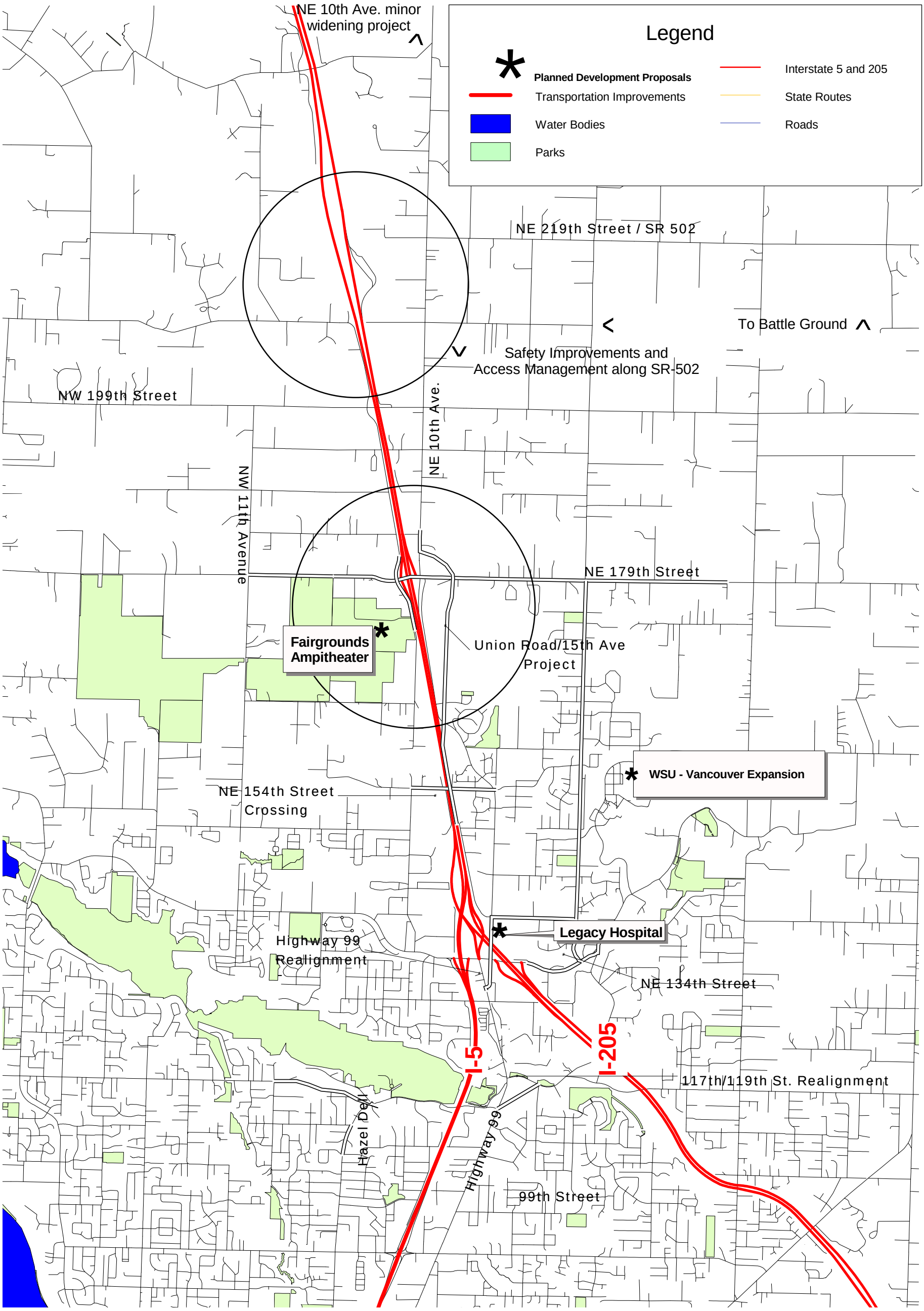


Figure 21
Public and Private Development Proposals in Interchange Vicinity

N